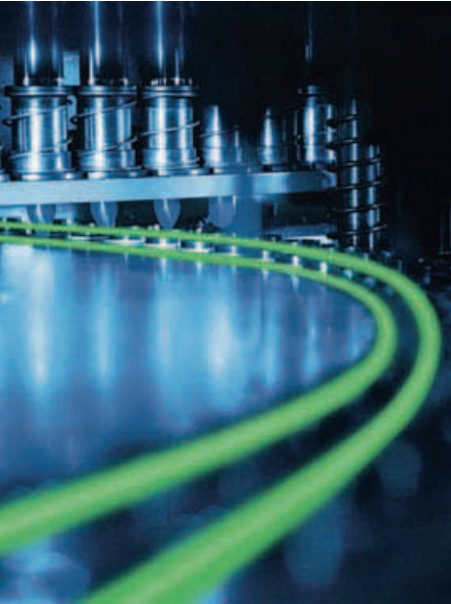


PROFINET/ Industrial Ethernet



2/4	Industrial Ethernet	2/355	ET 200S distributed I/Os
2/25	PROFINET	2/360	ET 200pro distributed I/O
2/29	Passive network components	2/368	ET 200M distributed I/Os
2/98	Industrial Ethernet Switches	2/370	Motion Control System SIMOTION
2/183	Industrial security	2/382	SINUMERIK CNC Automation Systems
2/192	CPUs for SIMATIC S7-300	2/385	SINAMICS S120 Drive system
2/232	CPUs for SIMATIC S7-400	2/389	SINAMICS G120 Drive system
2/253	SIMATIC PC-based Control/ Embedded Automation	2/403	SINAMICS G120D Distributed Frequency Inverter
2/260	System interfacing for SIMATIC and SINUMERIK	2/411	PROFINET Technology components
2/261	System interfacing for SIMATIC S7	2/417	Operator control and monitoring devices
2/299	System interfacing for PG/PC	2/421	RFID Systems
2/339	SIMATIC HMI connection options	2/427	Image Processing System
2/349	Accessories	2/447	Engineering/ Network management/ Diagnostics

PROFINET/Industrial Ethernet

Overview of contents

2/4	Industrial Ethernet	2/183	Industrial security
2/4	Introduction	2/183	Overview
2/7	Data communication	2/184	SCALANCE S
2/8	Communications overview	2/190	SOFTNET Security Client
2/10	Configuration examples		
2/12	Topologies	2/192	CPUs for SIMATIC S7-300
2/24	Network selection criteria	2/192	CPU 315-2 PN/DP
		2/198	SIPLUS CPU 315-2 PN/DP (extended temperature range)
2/25	PROFINET	2/199	CPU 317-2 PN/DP
2/25	Introduction	2/205	SIPLUS CPU 317-2 PN/DP (extended temperature range)
2/29	Passive network components	2/206	CPU 319-3 PN/DP
2/29	Overview of	2/212	CPU 315F-2 PN/DP
	passive network components	2/218	SIPLUS CPU 315F-2 PN/DP (extended temperature range)
2/32	Overview of Twisted Pair	2/219	CPU 317F-2 PN/DP
2/33	Industrial Ethernet FastConnect	2/225	SIPLUS CPU 317F-2 PN/DP (extended temperature range)
2/35	IE FC RJ45 Plug 2 x 2	2/226	CPU 319F-3 PN/DP
2/39	IE FC RF45 Plug 4 x 2		
2/41	IE Push Pull Plug PRO	2/232	CPUs for SIMATIC S7-400
2/44	IE Connecting Cable	2/232	CPU 414-3 PN/DP
	M12-180/M12-180/IE FC M12 Plug PRO	2/239	CPU 416-3 PN/DP
2/46	IE FC TP Cable 2 x 2	2/246	SIPLUS CPU 416-3 PN/DP
2/53	IE FC TP Cable 4 x 2	2/247	CPU 416F-3 PN/DP
2/56	IE Hybrid Cable		
2/58	Power cables	2/253	SIMATIC PC-based Control/ Embedded Automation
2/61	IE TP Cord	2/253	SIMATIC Microbox 427B-RTX
2/66	IE FC Outlet RJ45	2/256	SIMATIC WinAC Software PLC
2/71	IE FC RJ45 Modular Outlet		
2/78	Industrial Twisted Pair – Cables/connectors	2/260	System interfacing for SIMATIC and SINUMERIK
2/82	Overview of fiber-optic cables	2/260	Introduction
2/83	Glass fiber optic cables		<u>System interfacing for SIMATIC S7</u>
2/92	POF and PCF fiber-optic cables	2/261	CP 243-1
2/96	POF/PCF FOC termination kit	2/264	CP 243-1 IT
		2/268	CP 343-1 Lean
2/98	Industrial Ethernet Switches	2/273	CP 343-1
2/98	Overview	2/278	CP 343-1 Advanced
2/104	Compact Switch Module CSM 377	2/286	CP 443-1
2/107	SCALANCE X005 unmanaged	2/291	CP 443-1 Advanced
2/110	SCALANCE X-100 unmanaged		
2/118	SCALANCE X-200 managed		
2/129	SCALANCE X-200IRT managed		
2/139	SIPLUS SCALANCE X-200IRT managed		
2/140	SCALANCE X-300 managed		
2/151	SIPLUS SCALANCE X-300 managed		
2/152	SCALANCE X-400		
2/164	Industrial Ethernet OSM/ESM		
2/171	Industrial Ethernet SIPLUS OSM/ESM		
2/172	SCALANCE X-100 unmanaged media converter		
2/182	SIPLUS SCALANCE X-100 unmanaged media converter		

2/299	System interfacing for PG/PC	2/370	Motion Control System SIMOTION
2/299	Introduction	2/370	The SIMOTION system
2/300	Performance data	2/371	The hardware platforms
2/301	Connection capabilities to SIMATIC PCs	2/372	SIMOTION P350-3
2/302	CP 1604	2/374	SIMOTION D410
2/306	CP 1616	2/377	SIMOTION D425/D435/D445
2/310	CP 1613 A2	2/380	CBE30 Communication Board
2/314	CP 1623	2/381	MCI-PN Communication Board
2/318	S7-REDCONNECT	2/382	SINUMERIK
2/320	SOFTNET for Industrial Ethernet	CNC Automation Systems	
2/323	SOFTNET PN IO	2/382	SINUMERIK & SINAMICS
2/325	OPC server for Industrial Ethernet	2/383	SINUMERIK 840D sl – NCU 720.2 PN/NCU 730.2 PN
2/328	PN CBA OPC server	2/385	SINAMICS S120 Drive system
2/331	SNMP OPC server	2/385	SINAMICS S120 built-in devices
2/333	SOFTNET PN IO Linux	2/387	CBE20 Communication Board
2/335	SOFTNET-S7/Linux	2/388	CU310 PN Control Unit
2/337	SOFTBUS für Linux	2/389	SINAMICS G120 Drive system
2/339	SIMATIC HMI connection options	2/389	SINAMICS G120 chassis units
2/339	Overview	2/397	CU240S PN and CU240S PN-F Control Units
2/340	SIMATIC S7	2/403	SINAMICS G120D
2/342	SIMATIC WinCC flexible RT	Distributed Frequency Inverters	
2/344	SIMATIC WinCC	2/403	SINAMICS G120D
2/349	Accessories	2/407	distributed frequency inverter CU240D PN and CU240D PN-F Control Units
2/349	C-PLUG	2/411	PROFINET
Sec. 3	Power Supply PS791-1PRO	Technology components	
2/351	SICLOCK time synchronization	2/411	ERTEC enhanced real-time Ethernet controller
2/355	ET 200S distributed I/Os	2/414	Development Kits for ERTEC
2/355	IM 151-3PN interface modules	2/416	Development packages
2/357	SIPLUS IM 151-3PN interface module (extended temperature range)	2/417	Operator control and monitoring devices
	<u>Interface modules with integrated CPU</u>	2/417	SIMATIC Mobile Panels
2/358	IM 151-8 PN/DP CPU interface module	2/419	SIMATIC Panels
2/359	IM 151-8F PN/DP CPU interface module	2/420	SIMATIC Multi Panels (MP)
2/360	ET 200pro distributed I/O	2/421	RFID Systems
2/360	IM 154-4 PN interface modules	2/421	SIMATIC RF180C
2/363	IM 154-8 PN/DP CPU interface modules	2/424	SIMATIC RF170C
2/368	ET 200M distributed I/Os	2/427	Image Processing System
2/368	IM 153-4 PN	2/427	SIMATIC VS120
		2/431	SIMATIC VS130-2
		2/436	SIMATIC VS720
		2/447	Engineering/ Network management/ Diagnostics
		Sec. 3	SINEMA E
		Sec. 4	STEP 7
		2/447	SIMATIC iMap
		2/449	BANYnet bus analysis and diagnostics

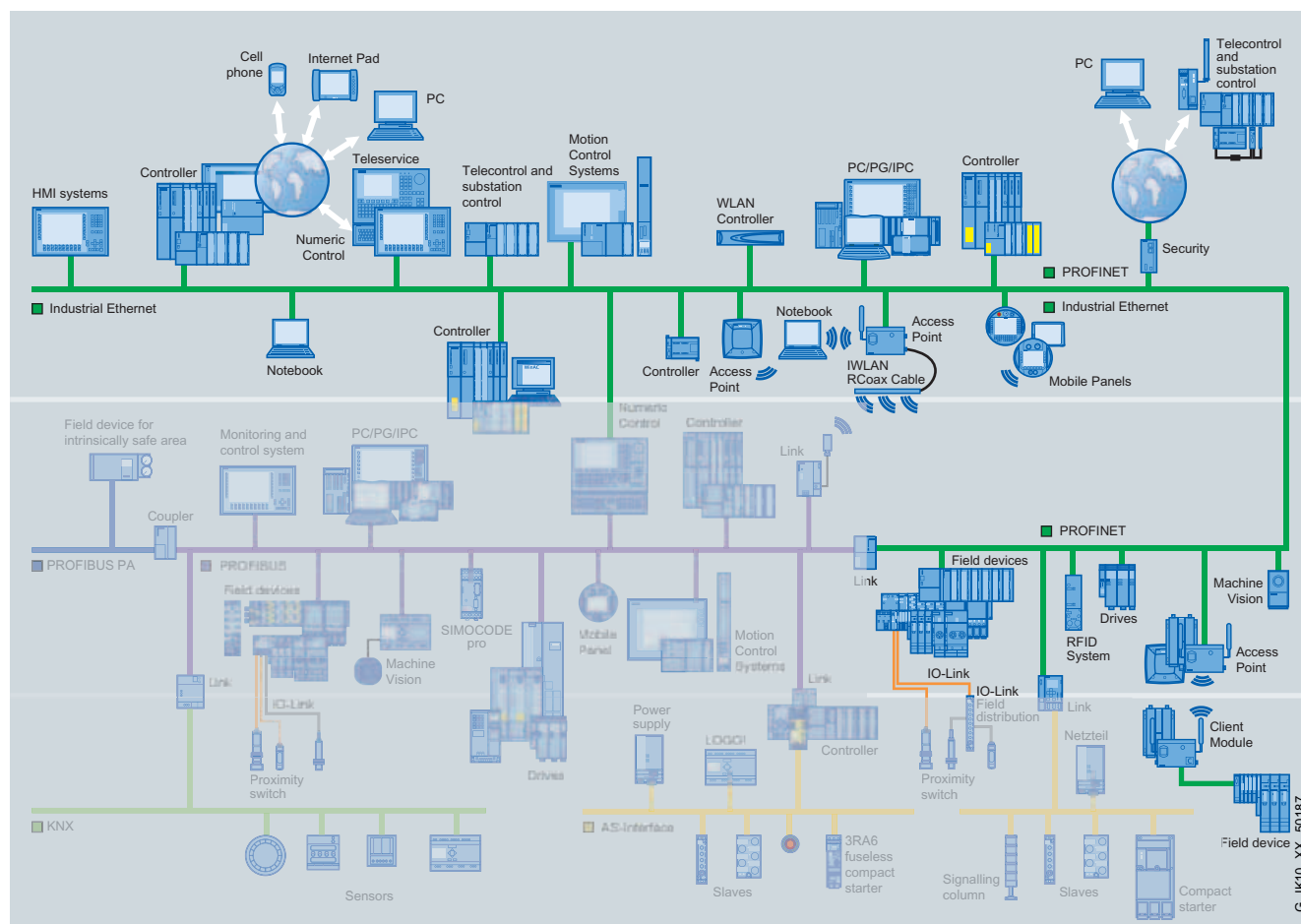
PROFINET/Industrial Ethernet

Industrial Ethernet

Introduction

Overview

- Area and cell network according to the international standards IEEE 802.3 (Ethernet) and IEEE 802.11 a/b/g/h (wireless LAN) designed for the industrial environment right down to the field level
- Connection of automation components (controllers and field devices) to each other and to PCs and workstations as well as components for wireless communication
- PROFINET, the Industrial Ethernet standard for automation, is based on Industrial Ethernet and supports the connection of devices from field level up to management level
- Comprehensive open network solutions can be implemented
- High transmission performance up to 1 gigabit/s
- Industrial Ethernet is the industry standard, well-proven world-wide with international acceptance
- Wireless expansion by means of Industrial Wireless LAN (IWLAN) as per IEEE 802.11
- Integration of conventional IT functionalities such as Web server and e-mail in the automation sector
- A safety solution specially designed for industrial automation with the industrial security concept covering all aspects of SCALANCE S



Industrial Ethernet in the communications landscape

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Overview (continued)

Ethernet

The LAN standard from the office sector.

Ethernet currently has a market share of over 90% with a rising trend, thus placing it in the pole position in the LAN landscape worldwide. This means that Ethernet has supplanted other LAN standards such as Token Ring or FDDI. The specification of this baseband LAN was developed in the 1970s and standardized in the international IEEE 802.3 standard. Ethernet has continued to experience rapid development and established itself in all speed ranges and application areas.

Milestones include:

- Virtually unlimited communication capabilities with scalable performance due to
 - switching technology, full duplex, redundancy
 - continuously rising data rates (10/100 Mbit/s, 1/10 Gbit/s)
- High availability of the network, because:
 - existing networks can be expanded without any adverse effects
 - network structures with any form of meshing compensate for the failure of individual network components (e.g. by means of the Rapid Spanning Tree Protocol)
- Compatible protocol expansions, e.g. support of virtual sub-networks and prioritized data traffic through the use of VLANs
- Structured cabling concept
 - Standardized connection technology
 - Simplest connection technology due to use of preassembled twisted pair cables
 - Glass fiber-optic cables for long distances, areas subject to RFI and inter-building cabling

Ethernet forms the basis for overlaid network protocols such as TCP/IP. TCP/IP is responsible for the transport of data between LANs and represents the basis for IT services (e.g. Internet). In addition, this enables different LAN technologies to be easily integrated, e.g. Ethernet with Wireless LAN.

Ethernet components for the office sector are offered by a large number of vendors, but do not always meet the specific requirements of the industrial sector.

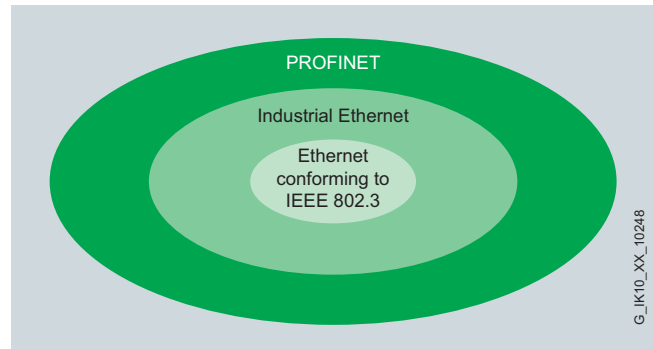
For planning, operation and maintenance of Ethernet networks, sufficiently qualified personnel are available worldwide.

Industrial Ethernet

The industry-standard version of Ethernet.

It was not only its performance when exchanging large volumes of data that made Ethernet ideal for use in the industrial environment – high availability, reliability, real-time capability, robust connection technology and ease of operation without special IT knowledge have also made this standard suitable for industrial use.

By means of corresponding additions for tough Industrial use, Siemens has shown that Ethernet can also be used successfully in these applications. This approach has been consistently and successfully applied not only for Industrial Ethernet and PROFINET, but also for Industrial WLAN.



PROFINET/Industrial Ethernet/Ethernet conforming to IEEE 802.3

Industrial Ethernet offers a powerful area and cell network according to IEEE 802.3 (Ethernet) for industrial applications. This ensures that the widest range of application areas, such as office and production, can be networked with one another. The numerous possibilities of the IT standards, familiar from the office world, can thus also be utilized in production and process automation.

Wherever practical, Industrial Ethernet utilizes innovative Ethernet technology and strengthens it for use in the industrial sector.

- Network components for use in tough industrial environments (dust, moisture, extreme temperatures, impact loads, vibrations)
- Fail-safe and simple connection method on site
 - FastConnect cabling system with RJ45 technology
 - Assembly of POF and PCF fiber-optic cables
- Failsafe networks through high-speed redundancy and redundant power supply
- Connection of automation components (controllers and field devices) to each other and to PCs and workstations
- Optimized communication between automation components and simultaneous, open communication according to TCP/IP standard
- Simple connection to the Wireless LAN (WLAN) and Industrial Wireless LAN (IWLAN) networks in accordance with IEEE 802.11
- A safety solution specially designed for industrial automation with the industrial security concept

Industrial Ethernet is the industry standard - tried, tested and accepted worldwide.

Among the Siemens Ethernet components for industrial use, the focus is on compatible successor products and an availability of up to 10 years.

PROFINET/Industrial Ethernet

Industrial Ethernet

Introduction

Overview (continued)

PROFINET

The open Industrial Ethernet standard for automation

PROFINET is the open, cross-vendor Industrial Ethernet standard (IEC 61158/61784) for automation.

Based on Industrial Ethernet, PROFINET enables direct communication between field devices (IO Devices) and controllers (IO Controllers), up to and including the solution of isochronous drive controls for motion control applications.

As PROFINET is based on Standard Ethernet according to IEEE 802.3, every device from field level to management level can be connected.

In this way, PROFINET enables system-wide communication, supports plant-wide engineering and applies IT standards, such as Webserver or FTP, right down to field level. Tried and tested fieldbus systems, such as PROFIBUS or AS-Interface, can be easily integrated without any modification to the existing devices.

More information

Note:

In many SIMATIC NET components with management function, extensive parameterization and diagnostics functions are provided over open protocols and interfaces (e.g. Web server, network management).

These open interfaces provide access to those components, which can also be used for illicit activities.

When using the above-mentioned functions and these open interfaces and protocols (such as SNMP, HTTP and Telnet), suitable security measures must be implemented that block unauthorized access to the components or the network especially from the WAN/Internet.

For this reason, automation networks can be isolated from the remaining corporate network using appropriate routers (e.g. the well-proven firewall systems).

These network transitions can be implemented using SCALANCE S products.

For further information, see the section "Industrial Security".

It is important to note the boundary conditions for use of the specified SIMATIC Net products (Order Nos. 6GK..., 6XV1) which you can view in the Internet:

Additional information can be found in the Internet under:

<http://www.siemens.com/simatic-net/ik-info>

Overview

Standard communication

This comprises standardized protocols for data communication.

ISO, TCP/IP, UDP transport protocols

ISO, TCP/IP and UDP are available as transport protocols.

PROFINET

Based on Industrial Ethernet, PROFINET enables direct communication of field devices (IO Devices) with controllers (IO Controllers) as well the solution of isochronous drive controls for motion control applications.

PROFINET also supports distributed automation with the help of component engineering (Component Based Automation).

Media Redundancy Protocol (MRP)

Procedure specified in the IEC 61158 Type 10 standard for increasing the network availability in a ring topology.

Information technology (IT)

IT integrates SIMATIC into the information technology via Industrial Ethernet. These communication media and paths are also available to SIMATIC as a result of the TCP/IP protocol. Depending on the product and stage of expansion, communications processors support technologies from the IT environment such as:

- *E-mail;*
Via the integral e-mail client, network components, communications processors and routers can send emails to provide information about plant states, e.g. plant standstill or imminent overload, or to automatically request a service call.
- *Freely definable HTML pages;*
Communications processors can perform web diagnostics with the aid of static HTML pages and a user-specific display is supported with the aid of freely definable HTML pages.
- *FTP;*
the File Transfer Protocol (FTP) permits simple, universal coupling, e.g. the PLC can be connected to different computers or embedded systems

IP routing (IP-R)

The connection for the SIMATIC S7 to Industrial Ethernet (CP 343-1 Advanced and CP 443-1 Advanced), with two separate interfaces (integrated network separation) and SCALANCE S and SCALANCE X414-3E, supports the forwarding of IP messages between Gigabit and PROFINET interfaces.

OPC (Openness, Productivity & Collaboration)

OPC is a standardized, open and manufacturer-independent interface and allows OPC-capable Windows applications to interface to S7 communication (SEND/ RECEIVE). Internet communication can be implemented over the OPC XML DA interface.

PG/OP communication

Integral communication functions that are used by the SIMATIC automation systems to perform data communication with HMI devices (e.g. TP/OP) and SIMATIC PGs (STEP 7, STEP 5). PG/OP communication is supported by MPI, PROFIBUS and Industrial Ethernet.

S7 communication

S7 communication is the integral communications function (SFB) that has been optimized within the SIMATIC S7/C7. It enables PCs and workstations to be connected. The maximum volume of user data per task is 64 KB. S7 communication offers simple, powerful communication services and provides a network independent software interface for all networks.

Open communication

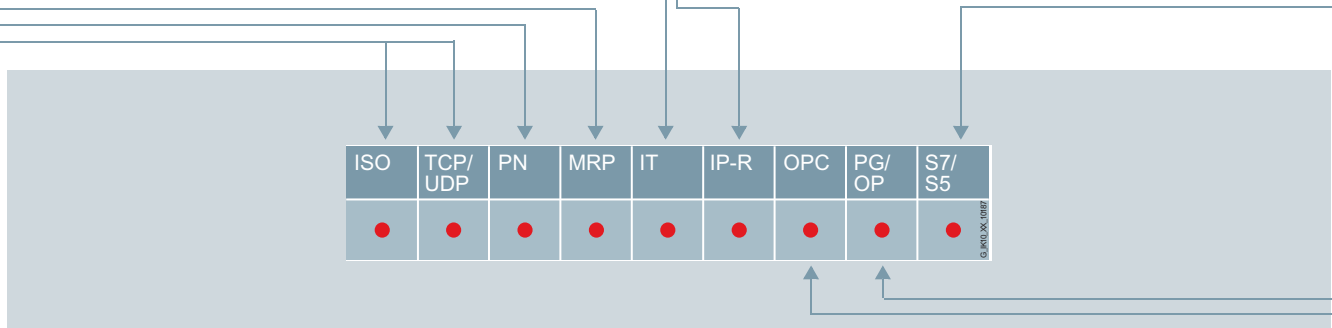
The open communication (SEND/RECEIVE) allows the SIMATIC S7 controller to communicate with other SIMATIC S7 and SIMATIC S5 controllers (S5-compatible communication), PCs and third-party systems. In addition, for the simple connection of HMI stations, FETCH and WRITE are offered.

System connections

For many data terminals, communications processors (CPs) are available that already have the communications functions implemented as firmware and which therefore relieve the data terminal of communication tasks (e.g. flow control, blocking, etc.).

Time synchronization

By means of SIMATIC procedures or NTP (Network Time Protocol), plant-wide time synchronization is achieved.



PROFINET/Industrial Ethernet

Industrial Ethernet

Communications overview

Overview

	Hardware	Transport protocol			PROFINET			MRP	IT		IP-R	PG/OP	S7 communication		Open communication			Time			SINAUT ST7
		ISO	TCP	UDP	IO Controller	IO Device	CBA		Diagnostics (Web, SNMP)	FTP, e-mail, freely definable HTML pages			Standard system	High-availability communication	SEND/RECEIVE	Fetch/Write	TSEND/TRECV	Sending stations	Receiving stations	with NTP	
SIMATIC S7-200	CP 243-1		•									•	•								
	CP 243-1 IT		•						• ⁵⁾	•		•	•								
SIMATIC S7-300/C7	CP 343-1 Lean		•	•		•			•			•	• ⁴⁾		•	•			•	•	
	CP 343-1	•	•	•	• ²⁾	• ²⁾			•			•	•		•	•			•	•	
	CP 343-1 Advanced	•	•	•	•	•	•	•	•	•	•	•	•		•	•		• ³⁾	•	•	
	TIM 3V-IE											•									•
	TIM 3V-IE Advanced											•									•
	TIM 4R/RD											•									•
	TIM 4R-IE											•									•
SIMATIC S7-400	CP 443-1	•	•	•	•			•	•			•	•	• ¹⁾	•	•	•	• ³⁾	•	•	
	CP 443-1 Advanced	•	•	•	•		•	•	•	•	•	•	•	• ¹⁾	•	•	•	• ³⁾	•	•	
	TIM 4R/RD											•									•
	TIM 4R-IE											•									•

1) ISO protocol only
 2) IO Controller or IO Device
 3) if S7-CPU is clock master
 4) S7 server only
 5) only standard page for system diagnosis

• suitable

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































Communications overview for SIMATIC, SINUMERIK and SINAUT

PROFINET/Industrial Ethernet

Industrial Ethernet

Communications overview

Overview (continued)

Hardware	Software	Operating system (32 bit)						OPC	Transport protocol			PROFINET			MRP	IT		IP-R	PG/OP	S7 communication		Open communication		Time	
		Windows XP Pro	Win 2003 Server / 2003 R2 Server	Windows Vista Business Ultimate	Linux	Other operating systems			ISO	TCP	UDP	IO Controller	IO Device	CBA		Diagnostics (Web, SNMP)	FTP, e-mail, freely definable HTML pages			Standard system	High-availability communication	SEND/REC/	Fetch/Write	Sending stations	Receiving stations
CP 1613 A2 (PCI 32 Bit)	S7-1613		•	•				•	•	•								•	•	•		•	•	•	•
CP 1623 (PCIe x1)	S7-REDCONNECT		•	•				•	•									•	•	•		•	•	•	•
CP 1616 (PCI 32 Bit) CP 1604 (PCIe 104)	DK-16xx PN IO	•			•					•		•	•			•									
SIMATIC PG/PC with integrated interface 1)	SOFTNET PN IO		•	•				•		•		•													
	SOFTNET-S7		•	•				•	•	•									•	•		•	•		
	SOFTNET-S7 Learn		•	•				•	•	•									•	•		•	•		
	SOFTNET-PG		•	•				•	•	•									•						
	PN CBA OPC-Server		•	•				•		•			•												
Ethernet Cards 3)	SOFTNET-S7/ Linux				•			•	•									•	•						
	SOFTNET PN IO/ Linux				•				•		•														

1) for information on other hardware, see www.siemens.com/simatic-net/ik-info

2) PG/OP communication

3) that are supported by TL/DLPI drivers


4) IT, FTP and UDP functionalities arise in conjunction with the hardware/the CPs and the Windows/Linux software of the PC

5) Software source of the card driver included; for Suse 10


6) by means of driver porting

7) CP 1623 with SNMP

8) with V2.3 firmware of the CP

 on SIMATIC NET-CD Edition 2007

• suitable

 suitable under certain conditions

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Communications overview for PG/PC

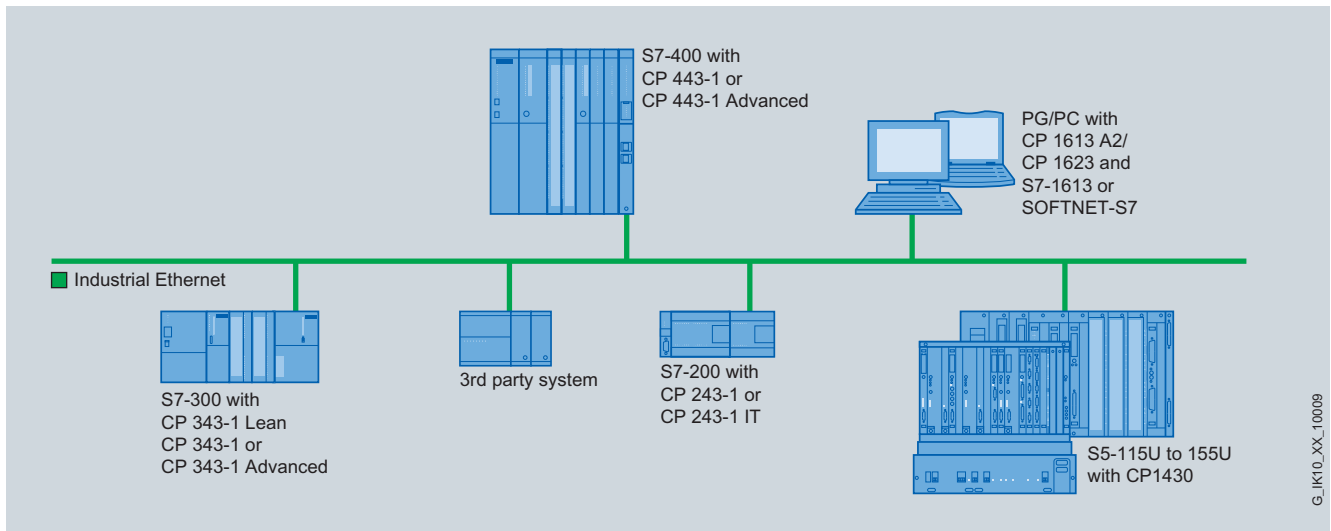
PROFINET/Industrial Ethernet

Industrial Ethernet

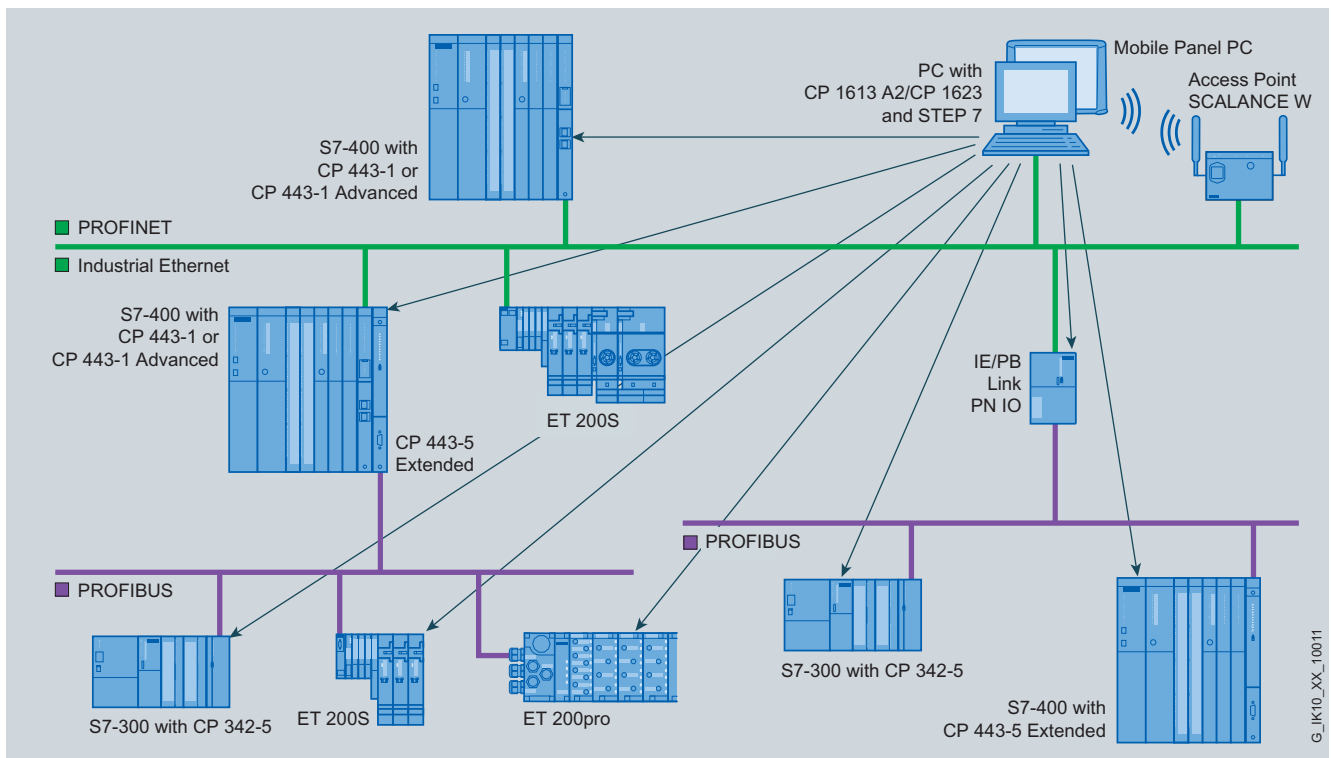
Configuration examples

Overview

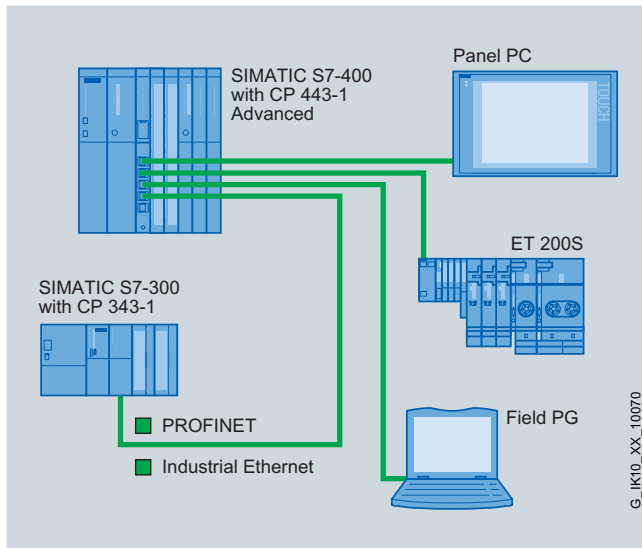
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Open communication via Industrial Ethernet



PG/OP communication for the transparent access to configuration and diagnostics data of the connected Industrial Ethernet stations

Overview (continued)

Construction of a small local PROFINET network with integrated switch in the CP 443-1 Advanced

PROFINET/Industrial Ethernet

Industrial Ethernet

Topologies

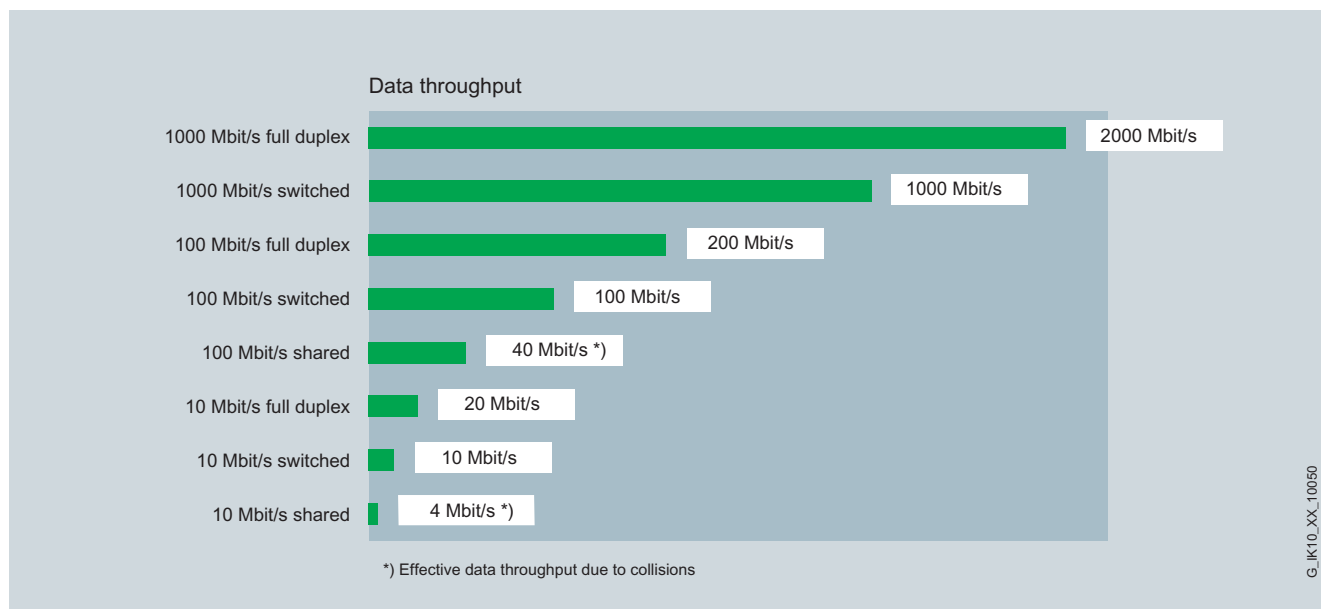
Overview

Network performance and network technologies for Industrial Ethernet

When combined, the current Industrial Ethernet technologies can boost performance on the network by a factor of 50 and more in comparison with the original 10 Mbit/s technology. These technologies are:

- **Fast Ethernet** with 100 Mbit/s:
Messages are transported much faster than Ethernet (10 Mbit/s) and therefore only occupy the bus for an extremely short time. For Fast Ethernet, a 4-wire FastConnect cabling system (Cat5e) is available with cable, plug and outlet.
- **Gigabit Ethernet** with 1 Gbit/s:
Gigabit Ethernet is faster than Fast Ethernet by a factor of 10, the bus is occupied for only one tenth of the time. For Gigabit Ethernet, an 8-wire FastConnect cabling system (Cat6) is available with cable, plug and outlet.
- **Full Duplex** prevents collisions:
The data throughput increases enormously because the usual message repetitions are avoided. Data can be sent and received simultaneously between two stations. The data throughput for a full duplex connection therefore rises to 200 Mbit/s with Fast Ethernet and to 2 Gbit/s with Gigabit Ethernet. With full duplex, a greater length of the network is possible. This means, for example, that when glass fiber-optic cables are used, distances of up to 70 km can be achieved.

- **Switching** supports parallel communication:
When a network is subdivided into several segments using a switch, or individual stations are connected direct to a switch, this results in load separation. Data communication is possible in each individual segment independently of the other segments. In the overall network, several messages can therefore be en-route simultaneously. The increase in performance is therefore due to the sending of several messages simultaneously.
- **Autocrossover** automatically crosses the send and receive cables on Twisted Pair interfaces.
- **Autosensing** describes the characteristic of network nodes (data terminals and network components) that automatically detect the transmission rate of a signal (10 Mbit/s, 100 Mbit/s or 1 Gbit/s) and support autonegotiation.
- **Autonegotiation** is a configuration protocol on Fast Ethernet. Before initiating the actual data transmission, network devices automatically negotiate a transmission mode which is supported by any device (1000 Mbit/s, 100 Mbit/s or 10 Mbit/s, full duplex or half duplex)



Gross data throughput of the networks

Overview (continued)

Ethernet Switching

The Industrial Ethernet switch has the following functionality:

- Depending on the number of available interfaces, switches are able to simultaneously interconnect several pairs of sub-networks or stations temporarily and dynamically, with each connection possessing the full data throughput.
- By filtering the data traffic on the basis of the Ethernet (MAC) address of the data terminal, the local data traffic remains local; only data to users of another subnetwork is forwarded by the switch.
- More data terminals can be connected than in a classic Ethernet network.
- Error propagation is limited to the subnetwork concerned.

The switching technology offers definite advantages:

- Subnetworks and network segments can be created.
- The data throughput is increased and with it the network performance as a result of structuring the data communication.
- Easy rules for network configuration.
- Network topologies with 50 switches and an overall extension of up to 150 km can be implemented without the need to take signal propagation times into account.
- Unlimited extension of the network by connecting individual collision domains/subnetworks.
- **Easy, reaction-free extension of existing networks.**

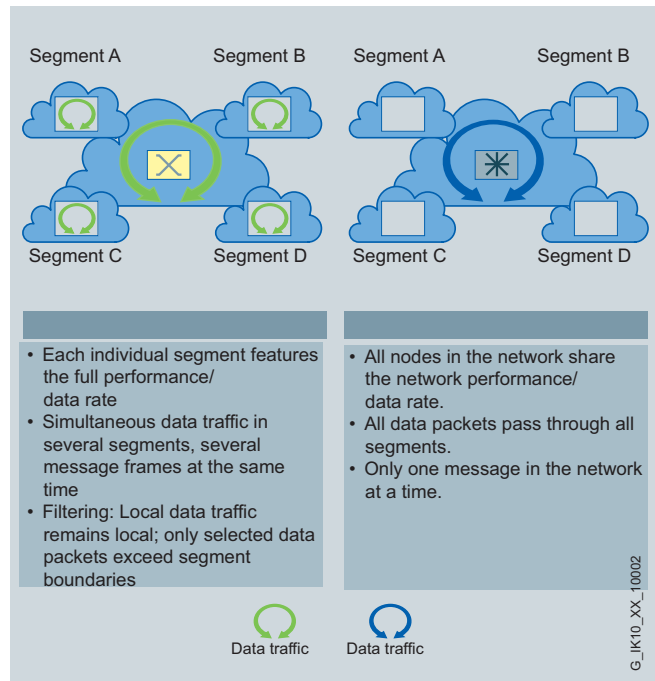
Full duplex

Full duplex (FDX) is an operating mode in the network that, in contrast to half duplex, allows stations to send and receive data simultaneously. When FDX is used, collision detection is automatically deactivated in the participating stations.

For FDX, transmission media with separate send and receive channels must be used, e.g. FOC and TP, and the participating components must be able to store data packages. With an FDX connection collisions do not occur, so components that support FDX can send and receive simultaneously at the nominal transmission rate. The data throughput therefore increases to twice the nominal transmission rate of the network, to 20 Mbit/s with the classic Ethernet and 200 Mbit/s with Fast Ethernet. With Gigabit Ethernet, up to 2000 Mbit/s are achieved.

A further advantage of FDX is the increase in the network extension.

By deactivating the collision principle, the distance between two components can be increased by the size of a collision domain or more. With full duplex, the maximum distance can extend as far as the performance limit of the send and receive components. This is especially the case in connection with fiber-optic cables. When glass fiber-optic cables are used, distances of up to 70 km can be achieved.



Increased performance through switching, full duplex

Autosensing/Autonegotiation

Autosensing describes the characteristic of network nodes (data terminals and network components) that automatically detect the transmission rate of a signal (10 Mbit/s, 100 Mbit/s or 1000 Mbit/s) and support autonegotiation.

Autonegotiation is the configuration protocol for Twisted Pair. It enables the participating nodes to negotiate and agree the transmission rate before the first data packages are transferred:

- 10 Mbit/s, 100 Mbit/s or 1000 Mbit/s
- Full duplex or half duplex

Autonegotiation can also be deactivated if a specific transmission rate has to be set.

The advantage with Autosensing lies in the problem-free interoperability of all Ethernet components.

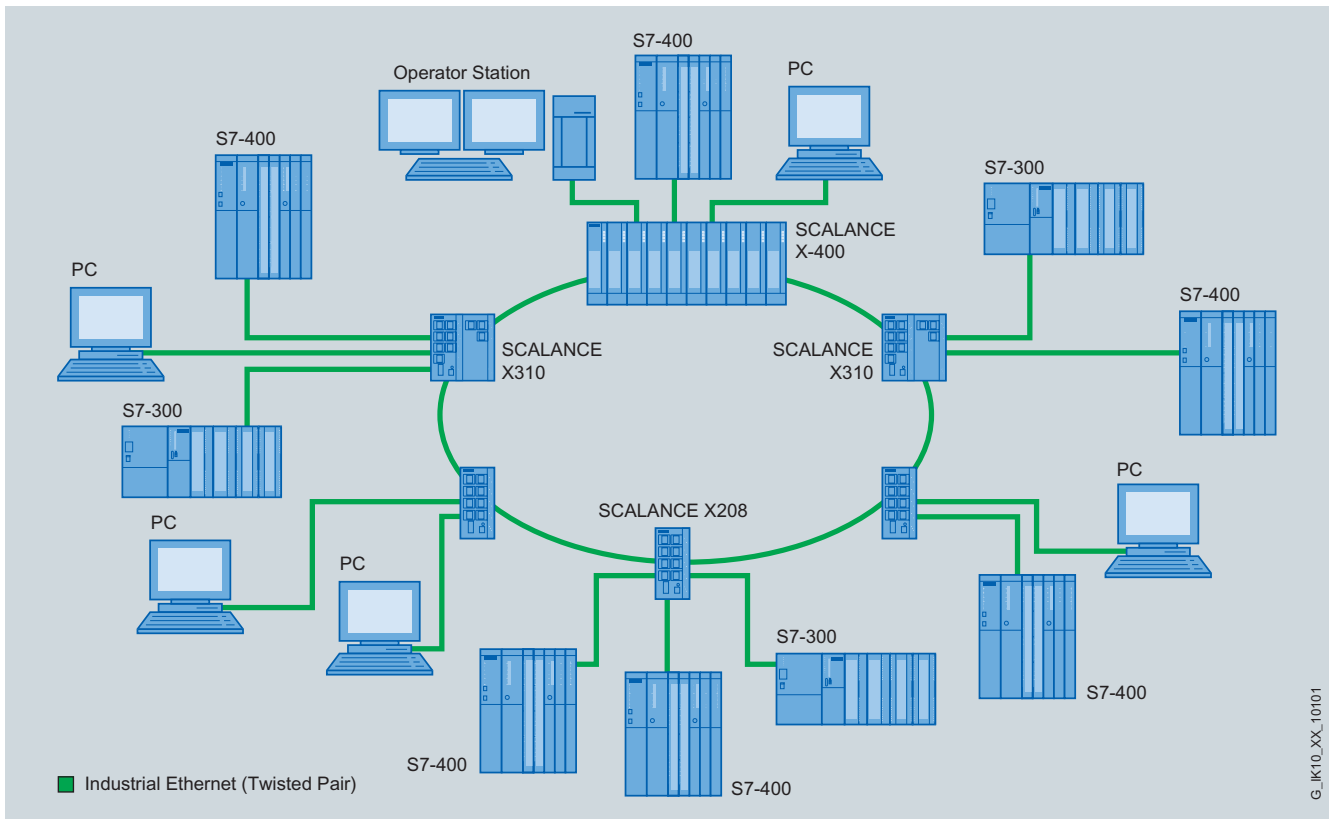
Classical Ethernet components that do not support Autosensing work problem-free with Fast Ethernet and new Gigabit Ethernet components that do support Autosensing.

Autocrossover

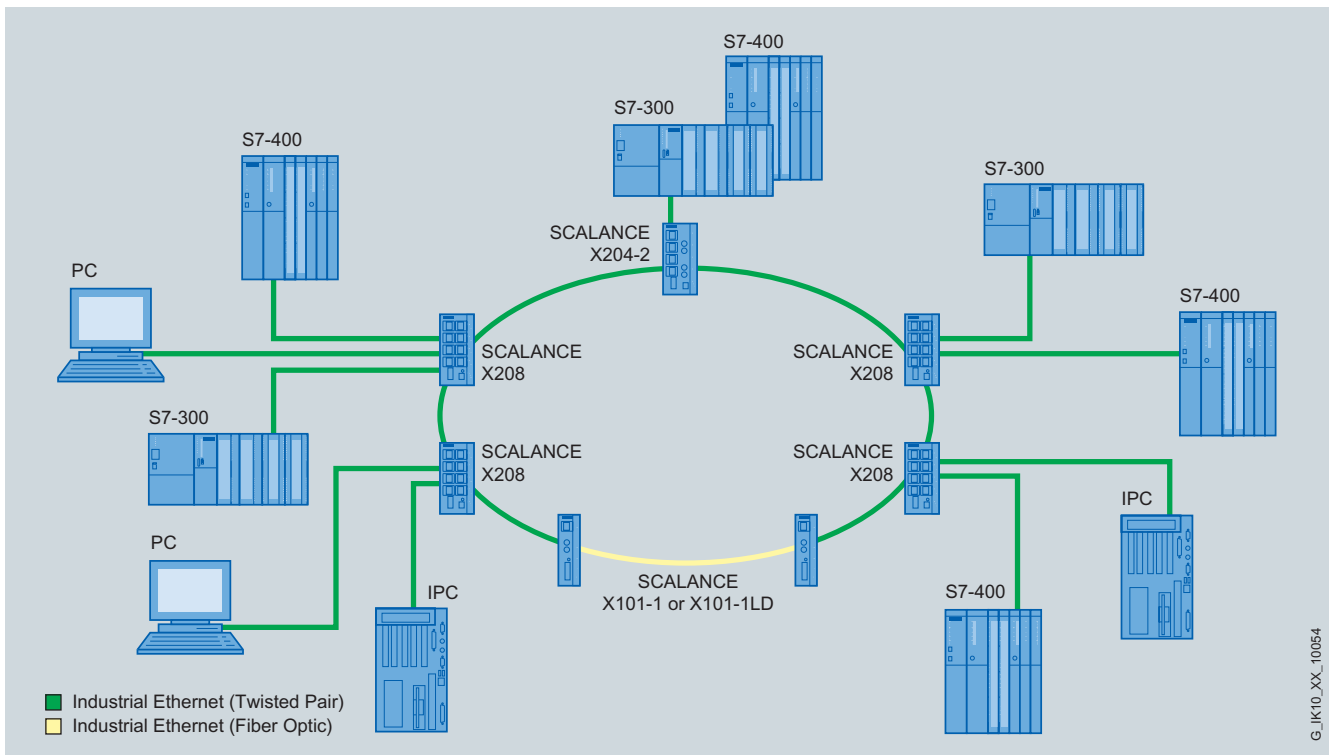
The Autocrossover function automatically crosses the send and receive cables on Twisted Pair interfaces. This means that crossed connecting lines (e.g. TP XP Cords) are no longer required.

Overview (continued)

2



Configuration with high-speed redundancy in the electrical ring



Electrical/optical ring topology with SCALANCE X101-1/X101-1LD

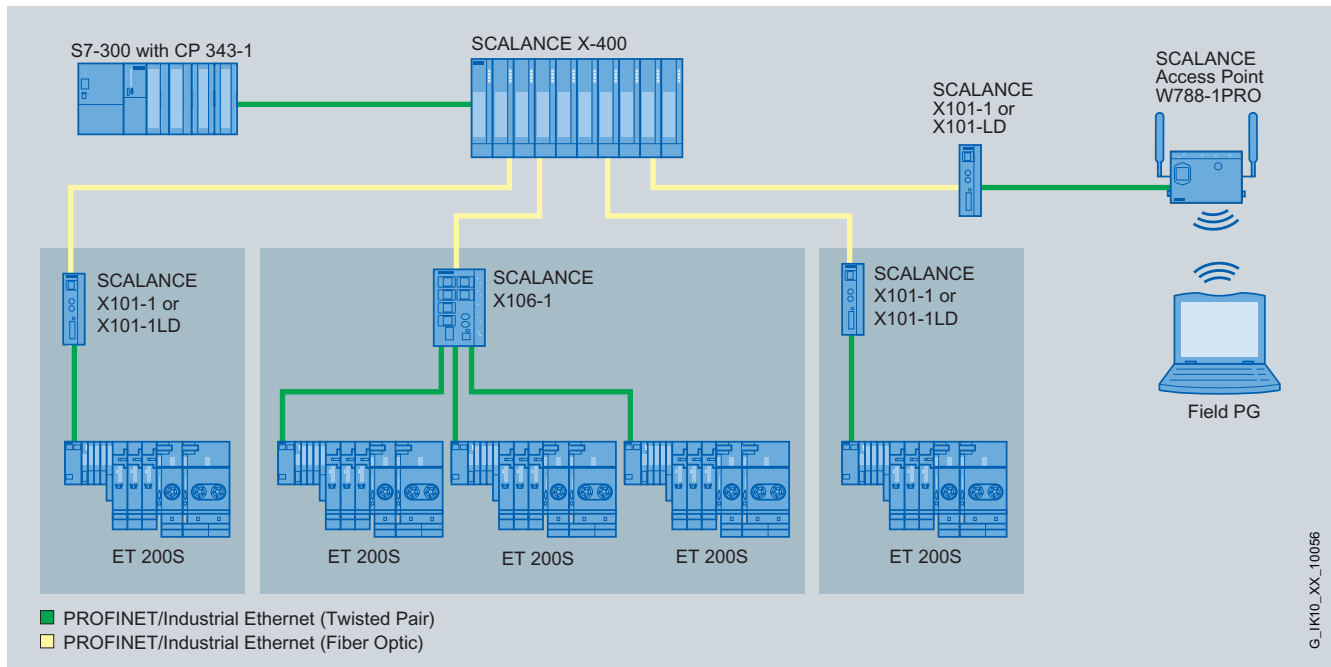
PROFINET/Industrial Ethernet

Industrial Ethernet

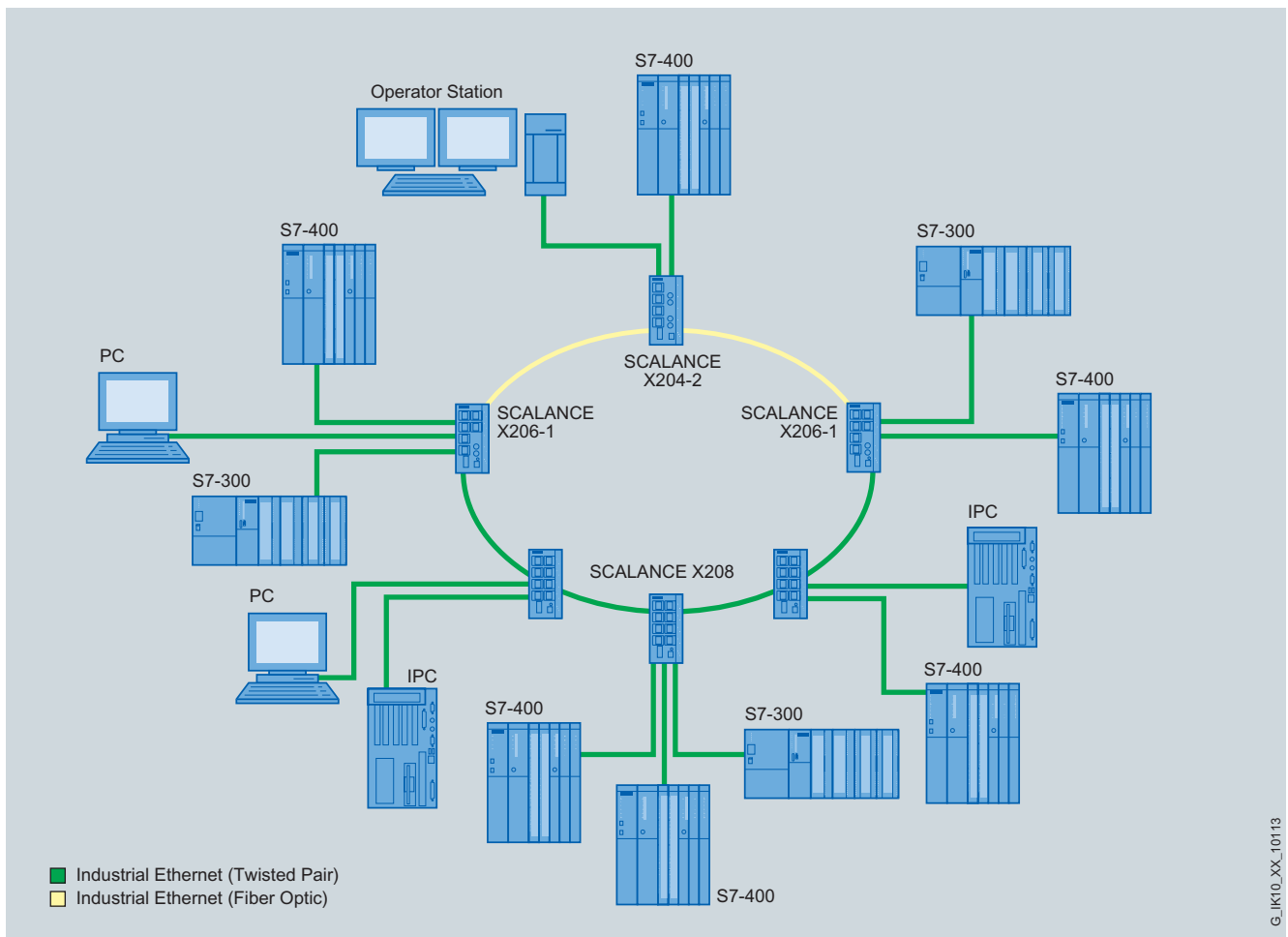
Topologies

Overview (continued)

2



Optical star topology with SCALANCE X101-1/X101-LD and remote SCALANCE W Access Point



Configuration with high-speed redundancy in the hybrid ring

Overview (continued)

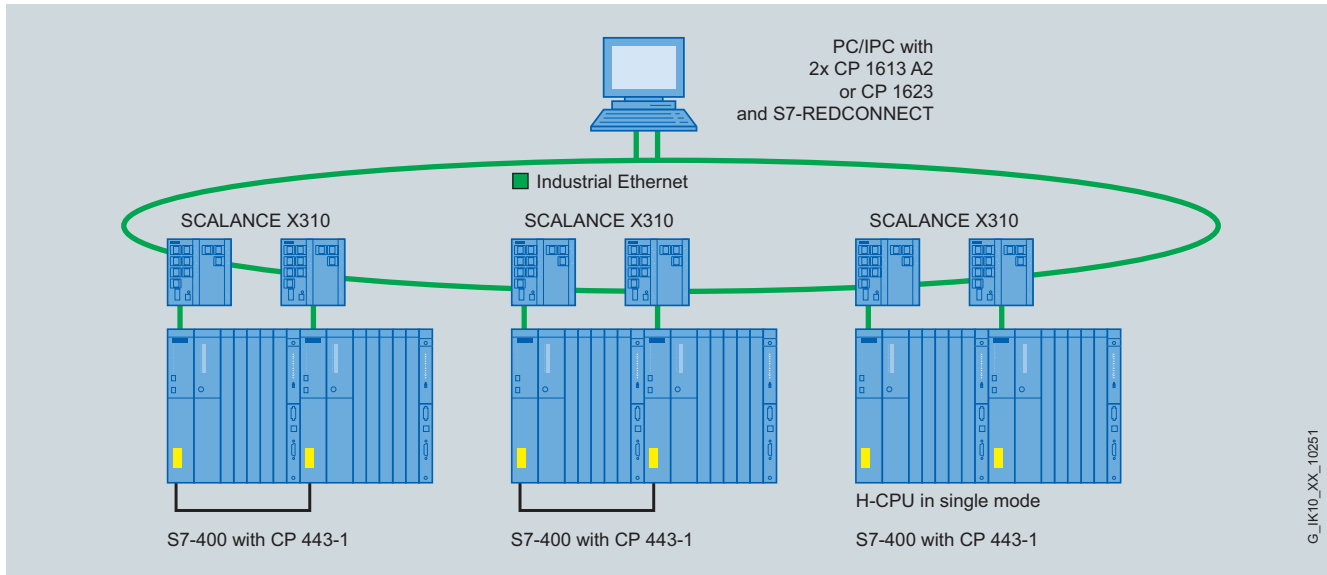
Fault-tolerant communication

The availability of the communication is increased by means of redundant communication connections, to which the data transmission can be switched quickly in the event of a fault.

Fault-tolerant S7-connections can be set up from S7-400H stations to

- other H stations (one- or two-channel)
- HMI PCs (S7-REDCONNECT software required)

2



Increased availability by means of redundant communication connections

PROFINET/Industrial Ethernet

Industrial Ethernet

Topologies

Overview (continued)

Redundancy with the Spanning Tree algorithm

The Spanning Tree algorithm is described in the IEEE 802.1d standard; it organizes any number of meshed Ethernet structures comprising bridges and switches.

To prevent data packages circulating in the network, in the case of closed meshes different connections are switched to standby so that an open tree structure results from the meshed structure.

The bridges/switches communicate for this purpose using the Spanning Tree protocol. This protocol is extremely complex because it has to handle any type of network structure.

The organization of network structures with the Spanning Tree protocol can take from 30 to 60 seconds. During this period, productive communication for reliable visualization or process control in the network is not possible.

In the time-optimized variant "Rapid Reconfiguration Spanning Tree" according to IEEE 802.1w, the time is shortened to between 1 and 3 seconds for up to 10 series-connected switches. For connecting to office networks, some SIMATIC NET switches support the Rapid Spanning Tree Protocol.

Switched network

Switched industrial networks can be configured electrically or optically with a linear, star or ring structure, or a combination.

They are constructed with SCALANCE X switches or with OSM and ESM. Fiber-optic conductors or Twisted Pair cables are used as the transmission media between the switches.

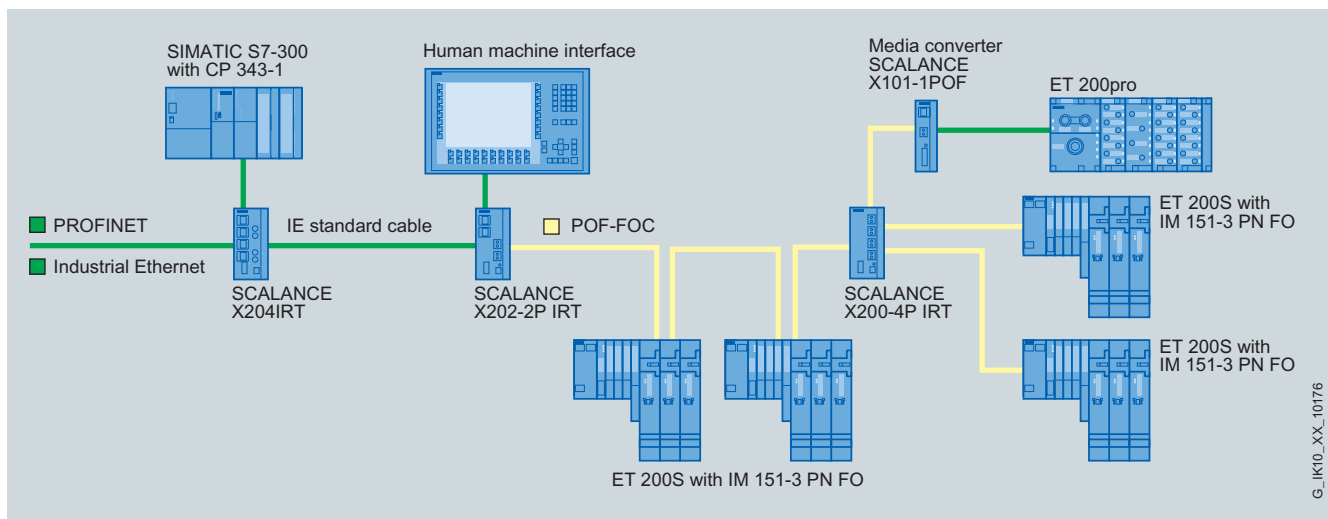
Data terminals or network segments are connected over twisted-pair cables or polymer optical fiber (POF). Switched networks can be of any size. The signal propagation times must be taken into account at distances over 150 km.

Optical cabling with POF/PCF or glass fiber optic cable

Fiber-optic cables are always recommended as an alternative to copper cables in environments subject to strong electromagnetic interference (EMI), if reliable equipotential bonding cannot be guaranteed, if the system is in the open air, or if no adverse effects caused by EMI are wanted.

Glass fiber optic cables are used to establish optical network topologies covering long distances, while for shorter distances, plastic fiber optic cable made of light-conducting plastics like polymer optical fiber (POF), or plastic covered glass fibers such as polymer clad fiber (PCF), are used. Simple fiber-optic cabling for machine-level use is implemented with the new SC RJ connection system for polymer optical fiber and PCF. The SC RJ connectors can be assembled especially quickly and simply on-site. The plastic fiber optic cables designed for this purpose can be used universally or specifically in festoon cable systems.

For optical PROFINET networking, products with POF or PCF connection are used, e.g. the Industrial Ethernet Switch SCALANCE X200-4P IRT, ET 200S distributed I/O or the SCALANCE X101-1POF media converter.



Mixed network with SCALANCE X202-2P IRT and SCALANCE X101-1POF media converter

Overview (continued)

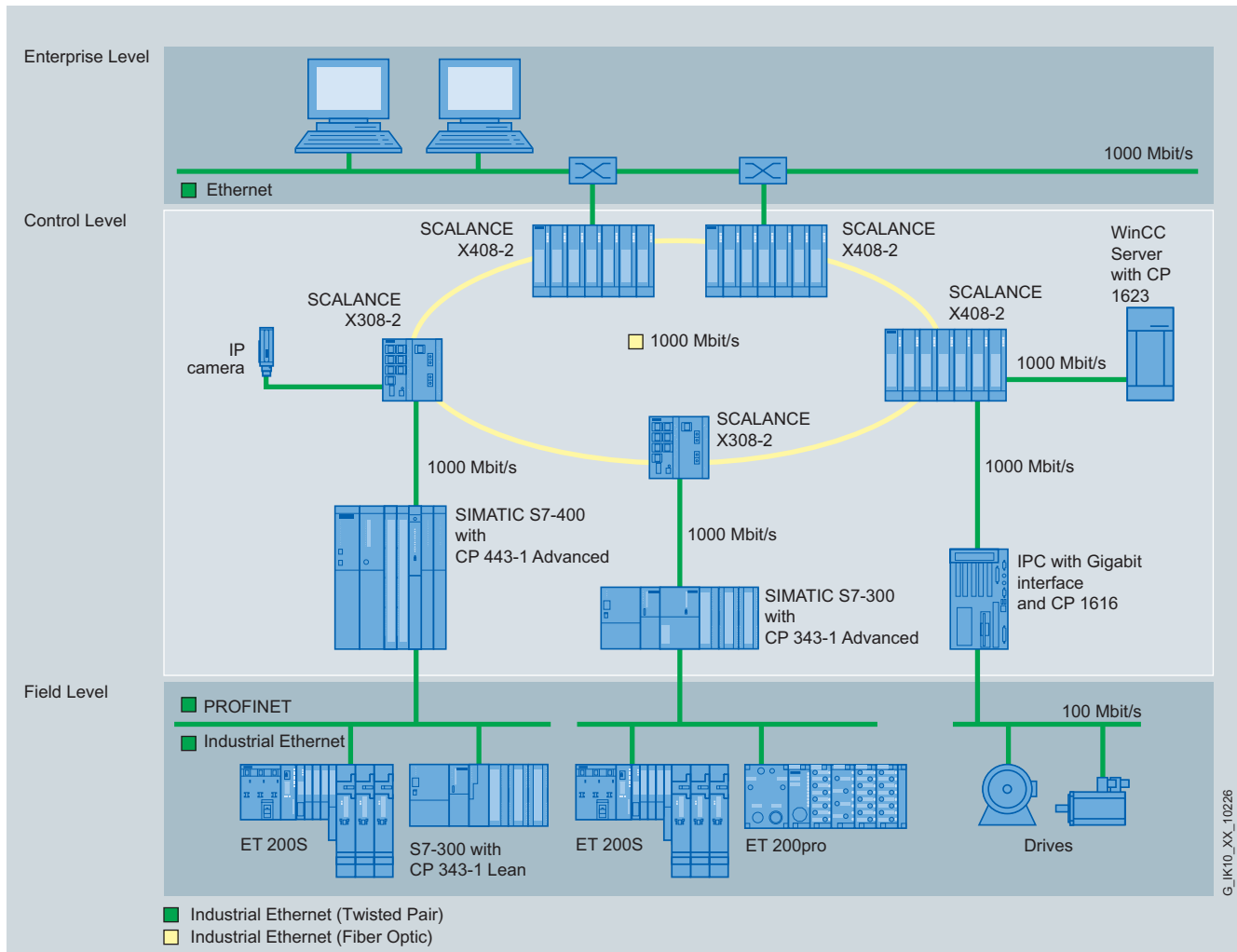
Gigabit at the control level

Whereas in the field level, short response times and small data message frames are in the forefront, the need for high data throughput is constantly increasing in the control level. The reason for this is the rapidly growing number of nodes and data-intensive systems such as HMI, SCADA, VISION systems, web applications or multimedia applications.

In addition to the Gigabit-capable network infrastructure, there are also Gigabit-capable system connections for PCs or SIMATIC S7-300/400. The CP 1623 communications processor for PCI Express supports a high-performance connection of the HMI/SCADA systems and simultaneously increases the reliability of the network by means of an optional external power supply.

The CP 343-1 Advanced and CP 443-1 Advanced communications processors for SIMATIC S7-300/400 implement integral network separation between the control level and field level and provide:

- Separate network connections on a module for the connection of two independent IP-subnetworks, e.g. control level is IP subnetwork 1 (Gigabit Ethernet) and the field level is IP subnetwork 2 (Fast Ethernet)
- Cross-network utilization of IT services through IP routing, such as access to web servers
- Access protection via a configurable IP access list
- Short response times for the lower-level field device connection with PROFINET



Network separation between field level and enterprise level including Gigabit communication at the control level

Network separation between field level and enterprise level

Networks often have to be separated physically from one another, but nevertheless have to communicate with one another. Reasons for network separation are deliberate load decoupling or different responsibilities within an enterprise (e.g. office and production network).

When using the CP 343-1 Advanced communications processors and CP 443-1 Advanced S7 controllers this requirement presents no problem. With the introduction of interfaces for separate IP subnetworks in Gigabit Ethernet and Fast Ethernet on one module, the cross-network use of IT services is possible by means of static IP routing. The access protection to the controller and the cross-network data traffic in this case is regulated by a configurable IP Access List.

PROFINET/Industrial Ethernet

Industrial Ethernet

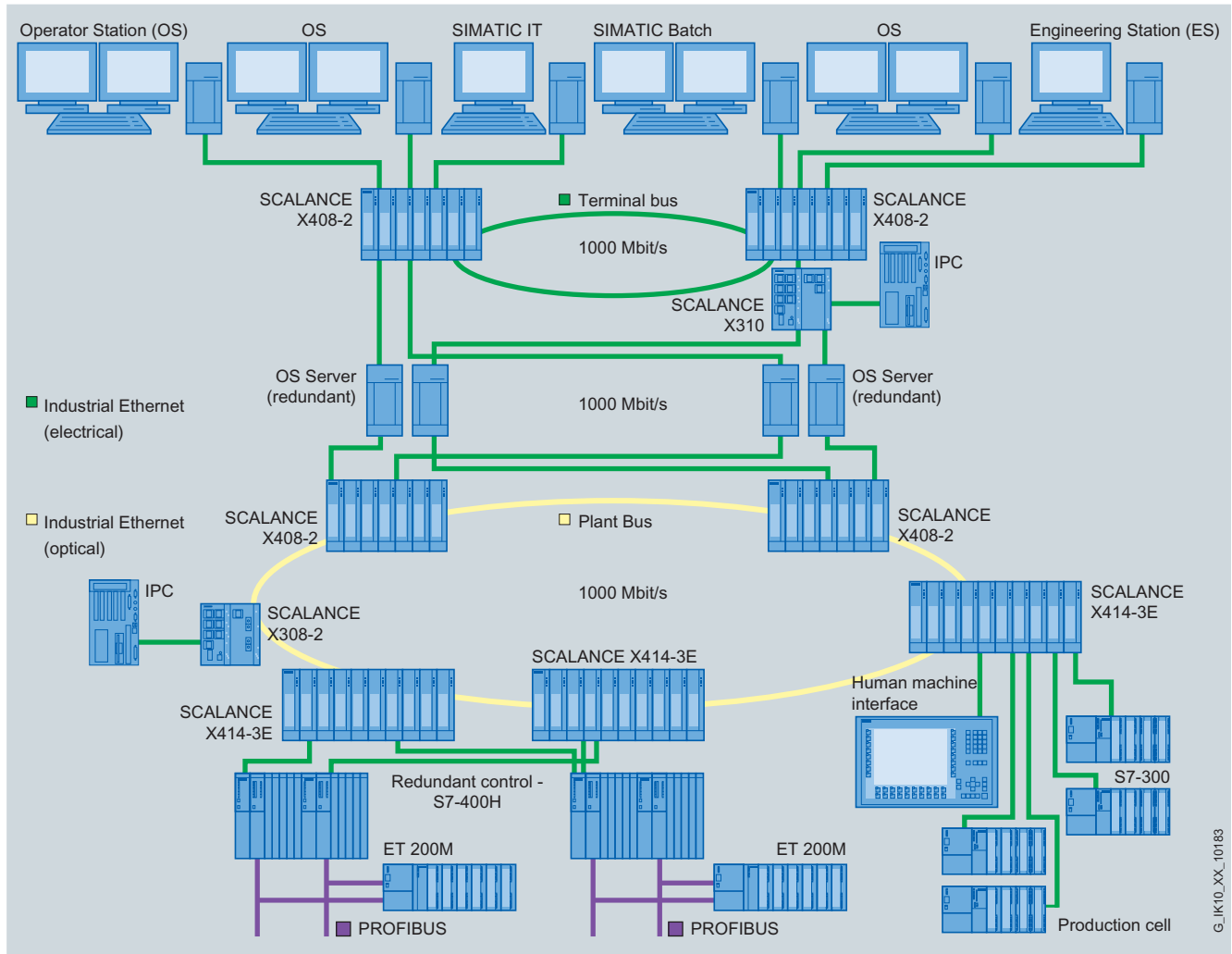
Topologies

Overview (continued)

SIMATIC PCS 7 process control system with Gigabit

In the control room, two SCALANCE X-400 switches are used on the terminal bus. If a high number of nodes are connected to the plant bus, SCALANCE X414-3E switches, for example, can be used with extender modules. These are connected together to create an electrical ring with a transfer rate of 1 Gbit/s.

Several operator panels are provided and divided between the two switches so that the system can still be operated in the event of a failure. The terminal and plant buses are connected using redundant servers, e.g. with SCALANCE X408-2 also via high-performance Gigabit lines.



Use of the SCALANCE X switches in a process control system, e.g. PCS 7

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Failsafe communication is also supported via industrial wireless LAN.



PROFINET/Industrial Ethernet

Industrial Ethernet

Topologies

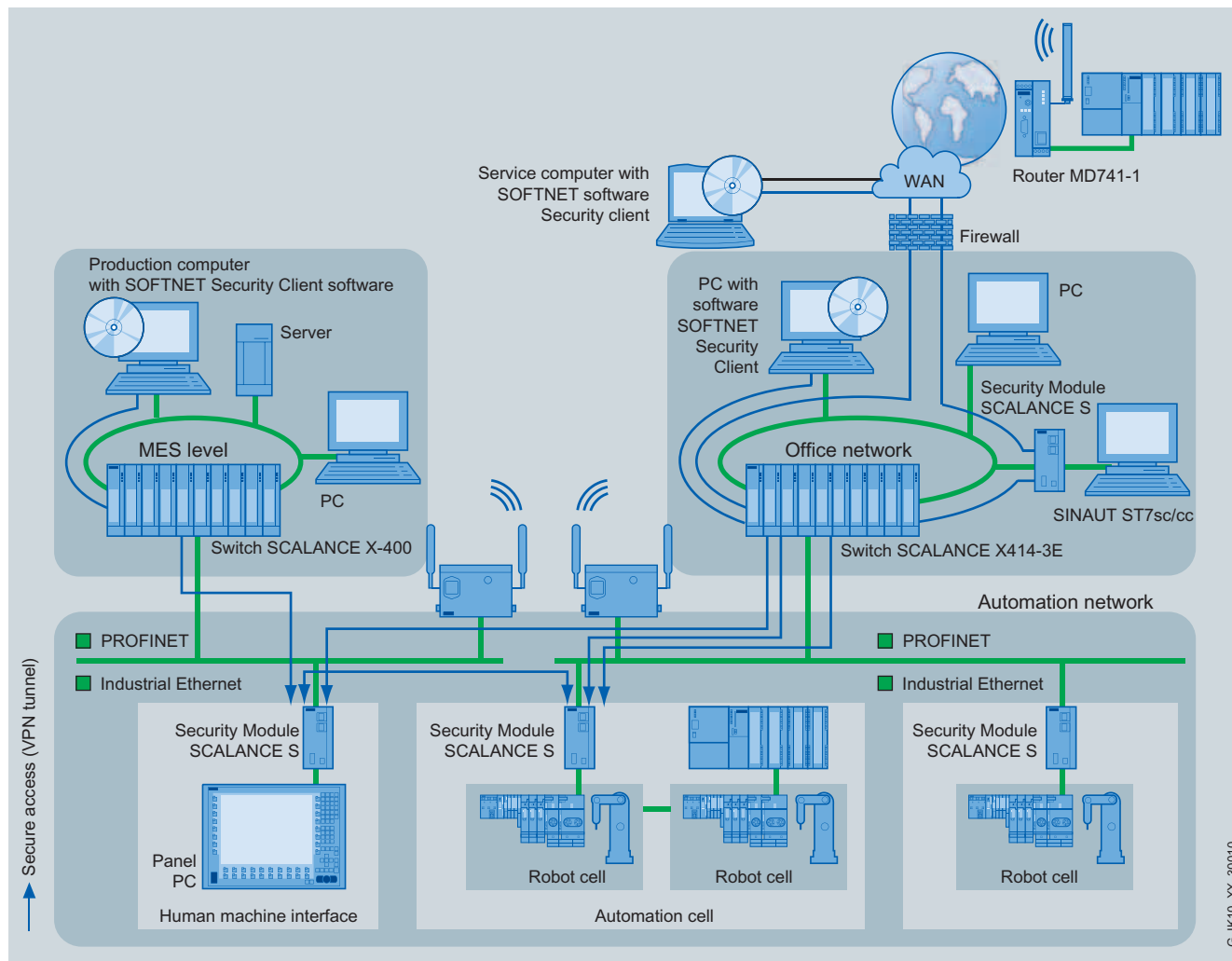
Overview (continued)

Secure communication with SCALANCE S

SCALANCE S security modules offer a scalable security functionality for the protection of automation networks. Apart from IP routing, the following are supported:

- Firewall for protecting the programmable controllers from unauthorized access regardless of the size of the network to be protected.
- Supplementary or alternative VPN (Virtual Private Network) for reliable authentication of the communication partners and encryption of the transmitted data

- Address translation
 - NAT (Network Address Translation) permits the use of private IP addresses in the internal network in that public IP addresses are converted to private ones
 - NAPT (Network Address and Port Translation) permits the use of private IP addresses in the internal network in that frames are converted to private IP addresses depending on the communications port used

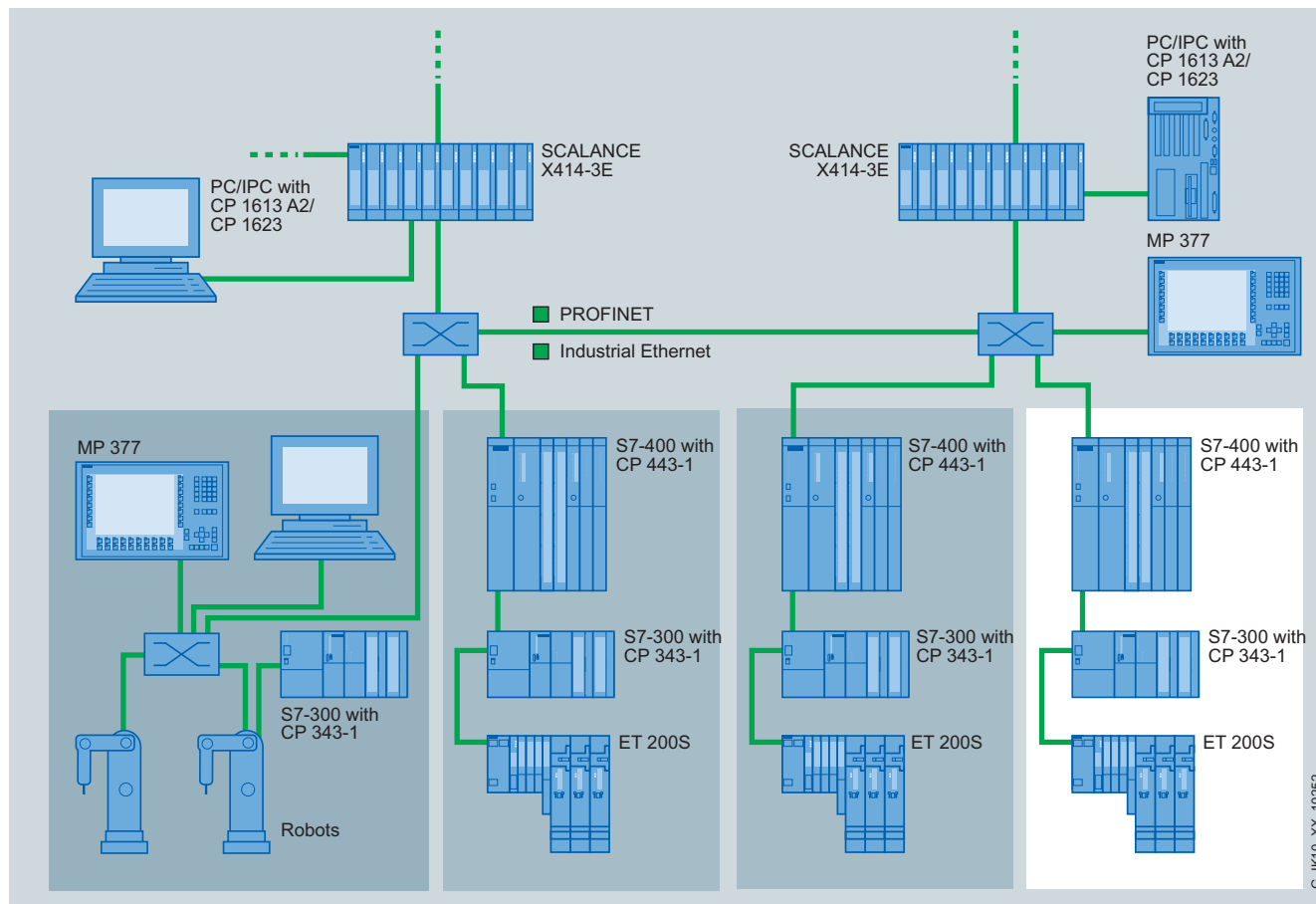


Secure communication with SCALANCE S

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In the case of SCALANCE X414-3E, high-speed IP routing permits communication between different IP subnetworks and routers.

- Static routing
- Dynamic routing OSPF (open shortest path first) and
- RIPv2 (routing information protocol)
- Redundant routing VRRP (Virtual Router Redundancy Protocol)



High-performance Layer 3 switching paired with redundant routing (VRRP)

PROFINET/Industrial Ethernet

Industrial Ethernet

Network selection criteria

Overview

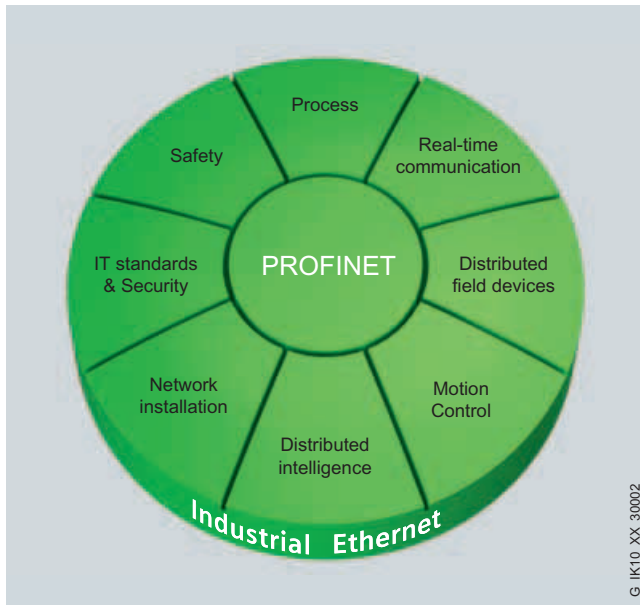
	Twisted pair network	Fiber optic network	Wireless link
Flexibility of the network topology	● ● ● ●	● ● ● ●	● ● ● ●
Suitability for high transmission rates	● ● ● ● 1)	● ● ● ● 1)	● ● ○ ○
Inter-building networking	○ ○ ○ ○	● ● ● ●	● ● ● ○
EMC	● ● ● ○	● ● ● ●	● ● ● ●
Simple cable laying	● ● ● ○	● ● ● ○	
Performance spectrum for special applications	Cables for indoor area; trailing cable; marine cable; FastConnect cables	Cables for indoor and outdoor area; trailing cable; halogen-free cable	—
Effect of voltage failure	Failure of a subnetwork ²⁾	Failure of a subnetwork ²⁾	Failure of a subnetwork ²⁾
Effect of path failure	Network breaks down into two subnetworks functioning in isolation ³⁾	Network breaks down into two subnetworks functioning in isolation ³⁾	—
Max. network expansion	5000 m ⁴⁾	Up to 150 km: over 150 km, consider signal propagation time	1000 m per segment ⁵⁾
Max. distance between two network nodes / Access Points	100 m	50 m POF 100 m PCF 3000 m multimode 70,000 m single mode	30 m indoors per segment 100 m indoors per segment
Max. connecting cable length	100 m	50 m POF 100 m PCF 3000 m multimode 70,000 m single mode	100 m feeder cable to the Access Point
Pre-assembled cables	Yes	Yes	—
Assembly on site	without special tool; FastConnect technology	Special tool required	with specialist personnel
Integrated diagnostics support	LED indicators; signaling contact; SNMP network management; Web-based management, PROFINET diagnostics	LED indicators; signaling contact; SNMP network management; Web-based management, PROFINET diagnostics	LED indicators; SNMP network management; Web-based management
Redundant network structures	Electrical ring or doubling of the infrastructure (linear, star, tree)	Optical ring or doubling of the infrastructure (linear, star, tree)	Multiple illumination or use of different frequency bands (2.4 and 5 GHz)
1) suitable for 10 Mbit/s, 100 Mbit/s and 1000 Mbit/s 2) Safeguard against subnetwork failure by means of redundant voltage supply 3) no effect in the case of ring structure 4) if there are 50 switches in the ring 5) depending on antenna used			
● ● ● ● suitable ● ● ● ○ partly suitable ● ● ○ ○ ● ○ ○ ○ ○ ○ ○ ○ not applicable			

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Comparison of networking media

Overview

PROFINET – the open Industrial Ethernet standard for automation



PROFINET is the innovative and open Industrial Ethernet standard (IEC 61158/61784) for industrial automation. With PROFINET, devices can be linked up from the field level through to the management level. PROFINET enables system-wide communication, supports plant-wide engineering and uses the IT standards right down to the field level. Fieldbus systems such as PROFIBUS can be easily integrated without any changes to existing devices.

PROFINET takes account of the following aspects:

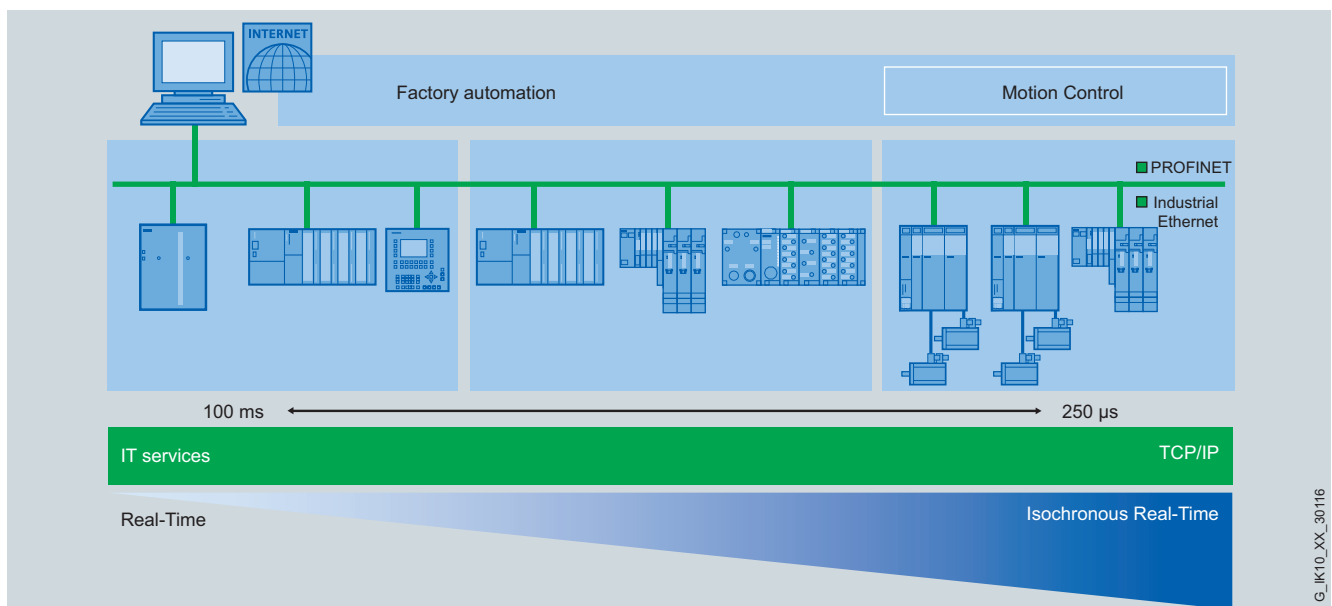
Real-time communication

PROFINET is based on Industrial Ethernet and uses the standard TCP/IP (Transport Control Protocol/Internet Protocol) for parameterization, configuration and diagnosis. Real-time communication for the transmission of user/process data is performed on the same line. PROFINET devices can support the following real-time properties:

- **Real-Time (RT)** is used for time-critical process data – i.e. for cyclical user data or event-driven alarms. For real-time requirements in automation, PROFINET uses an optimized real-time communication channel. The performance exceeds that of conventional fieldbuses and allows response times in the microsecond range. RT is the real-time communication for standard applications in order to connect field devices, e.g. distributed I/Os and drives, or implement distributed automation structures with PROFINET CBA.
- **Isochronous Real-Time (IRT)**
For especially challenging applications, there is the hardware-supported real-time communication Isochronous Real-Time (IRT) – for such things as motion control applications and high-performance applications in factory automation. With IRT, a cycle time of up to 250 µs with a jitter (synchronization accuracy) of less than 1 µs is achieved. To this end, the communication cycle is divided into a deterministic part and an open part. In the deterministic interval, the cyclical IRT message frames are transmitted and the TCP/IP communication takes place during the open interval. The two data transmissions exist side-by-side without interfering with each other.

ERTEC (Enhanced Real-Time Ethernet Controller)

The ASIC family of ERTEC supports PROFINET real-time communication (RT and IRT) and it is the basic technology for integrated system solutions with PROFINET. The ERTEC 400 is integrated in controllers and network components and the ERTEC 200 is integrated in simple field devices (I/Os, drives). Development Kits and Competence Centers support the user in developing his own devices.



Outstanding feature of PROFINET: Integrated real-time communication with simultaneous, unrestricted TCP/IP communication

PROFINET/Industrial Ethernet

PROFINET

Introduction

Overview (continued)

(PROFINET IO) distributed field devices

PROFINET IO enables distributed field devices (IO devices such as signal modules) to be connected directly to Industrial Ethernet. During configuration with STEP 7, these field devices are assigned to a central controller (IO Controller). Existing modules or devices can continue to be used with PROFINET-compatible interfaces or links, which safeguards existing investments by PROFIBUS or AS-Interface users. A configuration with standard and failsafe modules in one station is also possible.

An IO Supervisor serves HMI and diagnostics purposes – as on PROFIBUS – using hierarchical diagnostics dialogs (overview and detailed diagnostics). The user data is transferred by means of TCP/IP or IT standards. The simple engineering for PROFINET, field-proven with PROFIBUS, was adopted here. From the viewpoint of programming with STEP 7 there is no difference between PROFIBUS and PROFINET when accessing an IO device. Users can thus very easily configure field devices on Industrial Ethernet on the basis of the know-how acquired with PROFIBUS.

By retaining the device model of PROFIBUS, the same diagnostics information is available on PROFINET. As well as device diagnostics, module-specific and channel-specific data can also be read out from the devices, enabling simple and fast location of faults.

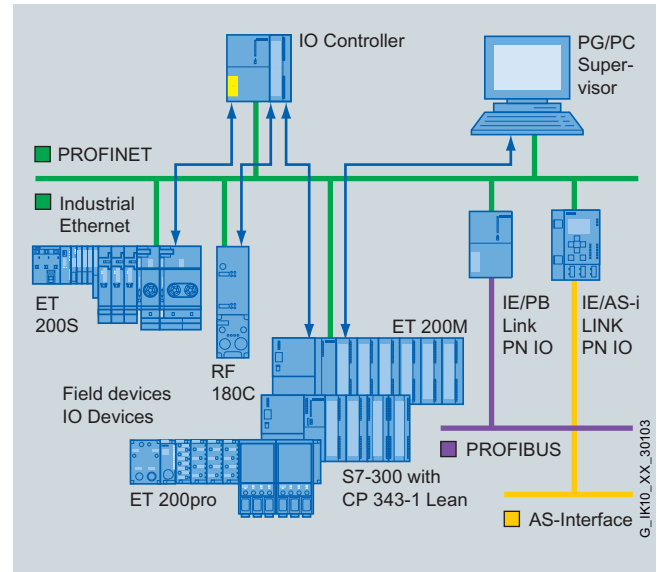
Alongside the star, tree and ring topologies, PROFINET also supports the line topology shaped by established fieldbuses. By integrating switch functionality into the devices, for example as with the S7-300 with CP 343-1 Lean, CP 343-1, or the SIMATIC ET 200S, ET 200M or ET 200pro distributed field devices, line topologies that are oriented around the machine or plant structure can be formed. This results in savings in cabling overhead and cuts down on components such as external switches.

In addition to the products with degree of protection IP20, a complete portfolio is available for IP65, such as the ET 200pro field device or the SCALANCE X208PRO switch.

The Fast Start-Up function allows rapid start-up of PROFINET IO Devices that are connected to SIMATIC controllers within less than a second. This allows tool changes, e.g. for robotics applications, to be accelerated.

Fieldbus integration

PROFINET permits easy integration of existing fieldbus systems. This requires the use of a proxy, which is a master of the PROFIBUS or AS-Interface system on the one hand and a station in the Industrial Ethernet on the other hand and which supports PROFINET communication. This protects the investments of plant operators, mechanical and plant engineers, and device manufacturers.



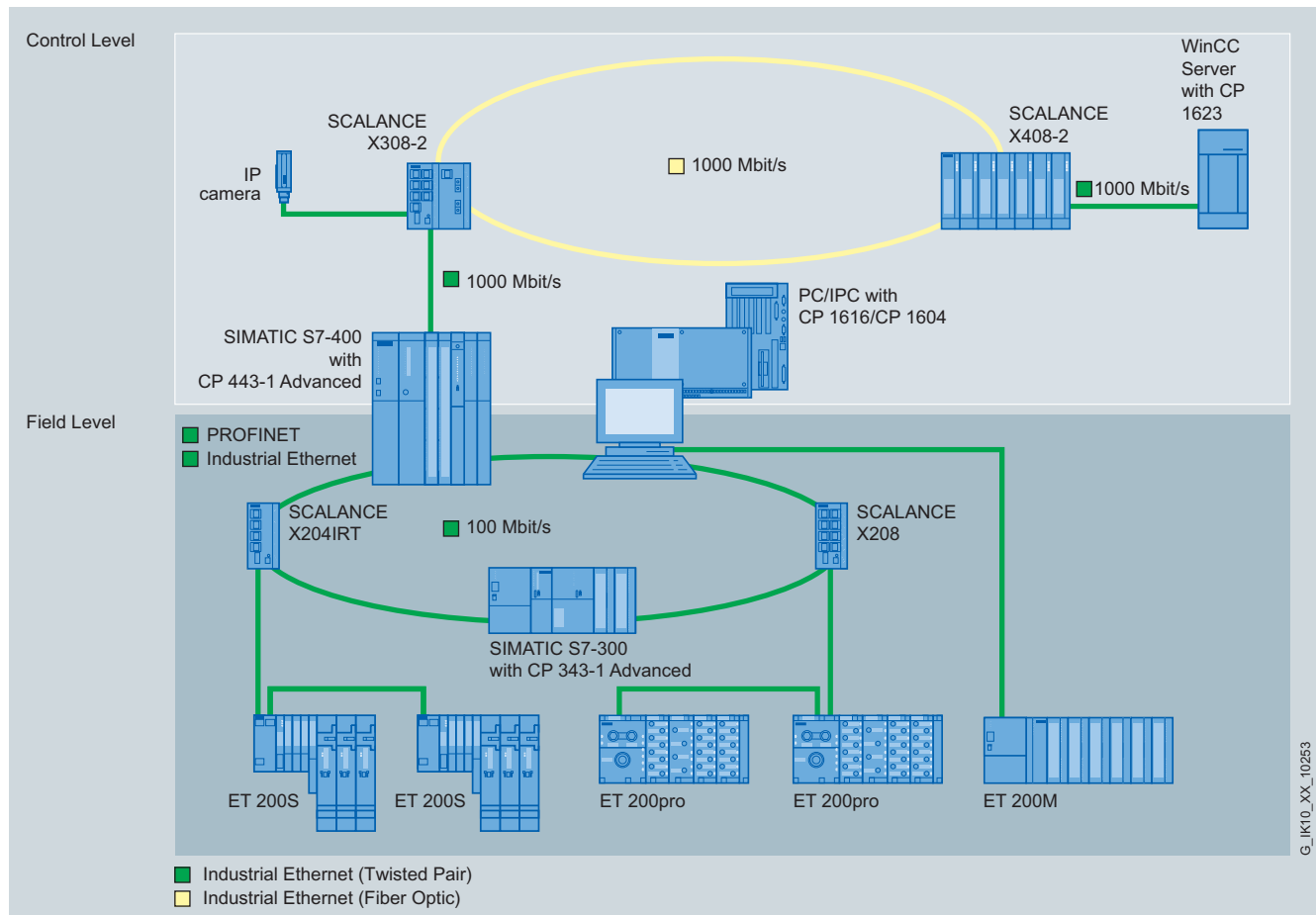
PROFINET with distributed field devices

Motion control

On the basis of PROFINET and using Isochronous Real-Time (IRT), it is possible to implement very fast, isochronous drive controls for high-performance motion control applications. The standardized drive profile PROFIdrive allows multi-vendor communication between motion controllers and drives independently of the bus system – Industrial Ethernet or PROFIBUS.

Isochronous real-time communication and standard IT communication can be implemented simultaneously on the same line without affecting each other.

Overview (continued)



Increased availability through media redundancy (MRP) with ring topologies

Distributed intelligence and machine-to-machine communication (PROFINET CBA)

PROFIBUS and PROFINET International have defined a standard for implementing modular plant structures: PROFINET CBA (Component Based Automation).

Positive experiences have already been made with modularization for machine and plant construction: Frequently-required parts are ready-made and can be rapidly combined into an individual unit when an order is placed. With PROFINET CBA, modularization can be extended to the automation engineering of the plant with the help of software components. The communication takes place via the real-time channel.

Software components are understood to be encapsulated, reusable software functions. These can be individual technological functions such as closed-loop controllers, or user programs for entire machines. Like blocks, they can be flexibly combined and easily re-used – regardless of their internal programming. Communication between the software components is carried out exclusively via the component interfaces. On the outside, only those variables are accessible on these interfaces which are required for interaction with other components.

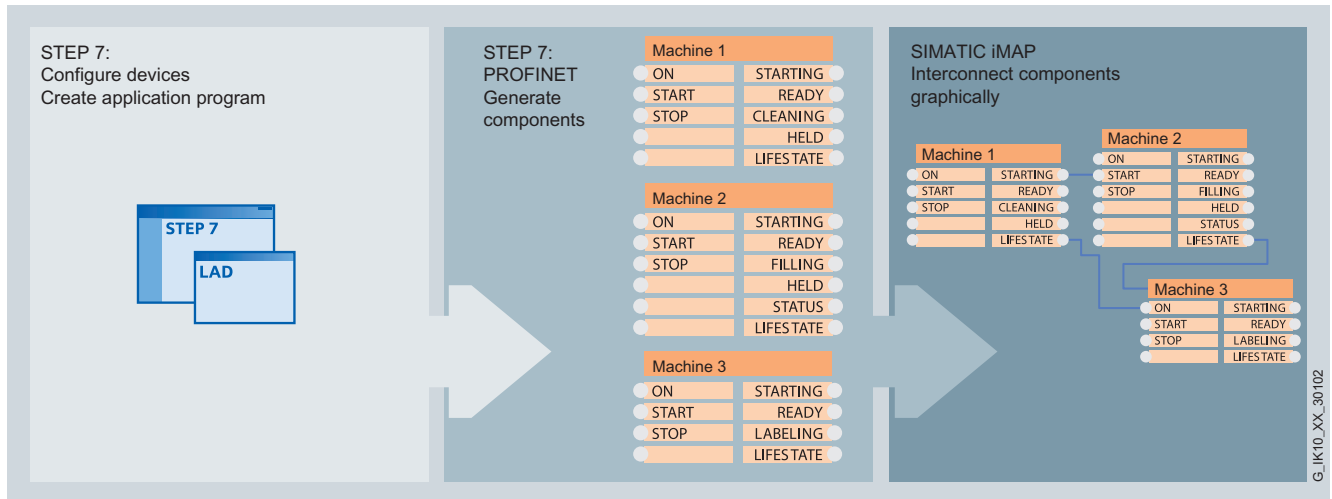
Software components are created with STEP 7 or other vendor-specific tools. SIMATIC iMap is used for plant-wide configuring of the overall plant using graphical interconnection of the components. The degree of modularization does not determine the number of programmable controllers required. Allocation to one central automation device or several distributed automation devices allows optimal utilization of the automation hardware.

PROFINET/Industrial Ethernet

PROFINET

Introduction

Overview (continued)



PROFINET CBA for distributed automation

Network installation

PROFINET enables the network to be installed without any specialist knowledge. The open standard based on Industrial Ethernet meets all the requirements relevant to the industrial sector. PROFINET allows the simple setup of the usual network topologies such as star, tree, line and ring, for increased availability, using industry-standard cabling.

The "PROFINET Cabling and Interconnection Technology Guide-line" supports manufacturers and users during network installation. Depending on the application, symmetrical copper cables, fiber optic-cables that are not susceptible to electromagnetic interference or wireless communication are used. Devices from different manufacturers are easily connected via standardized and rugged plug-in connectors (up to IP65).

For assigning addresses and network diagnostics, PROFINET uses the IT standards DCP (Discovery Configuration Protocol) and SNMP (Simple Network Management Protocol).

PROFINET offers new functions and applications for wireless communication with Industrial Wireless LAN. This enables technologies subject to wear, such as contact wires, to be replaced and permits driverless transport systems or personalized operating or maintenance devices to be used. Industrial WLAN is standard-based but also offers additional functions that permit the high-performance connection of field devices to controllers:

- **Bandwidth reservation;** reserves the bandwidth between an access point and a defined client. This ensures high, reliable performance for this client, regardless of the number of clients operated at the access point.
- **Cyclic data traffic and high-speed roaming (iPCF);** Various functions that are combined under the term "iPCF" permit cyclic data traffic in real time for several wirelessly linked PROFINET IO devices at the same time. In addition, this enables mobile stations to be transferred quickly from one radio field to another (roaming) so that the PROFINET IO communication is not interrupted.

These expansions to the standard enable high-performance wireless applications with PROFINET and SCALANCE W right down to the field level.

IT standards & security

In the context of Web integration, the data of PROFINET components is presented in HTML or XML format. Independently of the tool used, information from the automation level can be accessed from any station using a commercially available Internet browser. This considerably simplifies commissioning and diagnostics.

The advantages of this openness are however offset by the risks that arise, such as unauthorized access.

For this reason, PROFINET defines a graduated security concept – the "cell protection concept" – that can be used without a great deal of specialist knowledge and that largely rules out any operating errors, unauthorized access or manipulation without impeding the production operation. The SCALANCE S product range is available with software or hardware modules for the protection of automation cells. These protect the cells by means of firewalls (SCALANCE S602), which restrict the flow of data traffic, for example, so that only S7 communication is allowed through. In addition, the access to the cells that are formed can also be secured by a VPN tunnel (SCALANCE S612, SOFTNET Security Client) that allows secure access from the Internet as well.

Safety

The PROFIsafe safety profile, which has been tried and tested with PROFIBUS and which permits the transmission of standard and safety-related data on a single bus cable, can also be used with PROFINET. Standard switches, proxies and links can also be used for fail-safe communication. In addition, fail-safe communication is possible via Industrial Wireless LAN (WLAN).

PROFINET thus permits the implementation of standard and fail-safe applications with integrated configuration throughout the network – not only when designing new plants, but also when upgrading existing ones.

Process

PROFINET is the standard for all applications in automation. By means of the PROFIBUS integration, it also includes the process industry – including hazardous areas.

PROFINET/Industrial Ethernet

Passive network components

Overview of passive network components

Overview

Industrial Ethernet		Maximum cable lengths for industrial Ethernet connections						
	Type of fiber	0 - 10 m	0 - 50 m	0 - 55 m	0 - 85 m	0 - 100 m	0 - 750 m	0 - 3.000 m
IE FC cables 2x2 at 100 Mbit/s								
FC RJ45 outlet with 2x2 cable (additional 10 m patch cable can be connected in total)				● (0 - 45 m; Torsion Cable)	● (0 - 75 m; Marine/Trailing/ Flexible/ FRNC/Food/ Festoon Cable)	● (0 - 90 m; Standard Cable GP)		
Patch cable		●						
TP FC Standard Cable GP 2x2						●		
TP FC Flexible Cable GP 2x2					●			
TP FC Marine Cable 2x2 GP					●			
TP FC Trailing Cable 2x2					●			
TP FC Trailing Cable GP 2x2					●			
TP Torsion Cable 2x2				●				
TP FC FRNC Cable GP					●			
TP FC Food Cable		●	●	●	●			
TP FC Festoon Cable GP					●			
IE FC cables 4x2 at 1000 Mbit/s								
FC RJ45 outlet with 4x2 cable (AWG 22) (additional 10 m patch cable can be connected in total)						● (0 - 90 m; Standard Cable GP)		
IE FC RJ45 Plug 4x2 with Standard/Flexible Cable 4x2 (AWG 24)				●				
Patch cable		●						
IE Glass FOC								
FO FRNC Cable GP	Multimode (50/125)						● ²⁾	● ¹⁾
FO Standard Cable GP	Multimode (50/125)						● ²⁾	● ¹⁾
FO Ground Cable	Multimode (50/125)						● ²⁾	● ¹⁾
FO Trailing Cable	Multimode (50/125)						● ²⁾	● ¹⁾
FO Trailing Cable GP	Multimode (50/125)						● ²⁾	● ¹⁾
INDOOR FO Cable	Multimode (62,5/125)							● ¹⁾
FO Standard Cable	Multimode (62,5/125)							● ¹⁾
Flexible FO Trailing Cable	Multimode (62,5/125)							● ¹⁾
IE POF/PCF Fiber Optic Cable								
POF Standard Cable GP 980/1000	POF (980/1000)		● ¹⁾					
POF Trailing Cable 980/1000	POF (980/1000)		● ¹⁾					
PCF Standard Cable GP	PCF (200/230)					● ¹⁾		
PCF Trailing Cable	PCF (200/230)					● ¹⁾		
PCF Trailing Cable GP	PCF (200/230)					● ¹⁾		

1) at 100 Mbit/s

2) at 1000 Mbit/s



















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PROFINET/Industrial Ethernet

Passive network components

Overview of passive network components

Overview (continued)

		Options for connecting Industrial Ethernet cables with plugs, terminals or devices (IE)									
		electrical									
		IE FC Cable 4x2	IE FC Cable 2x2	IE TP Cord 2x2	IE TP Cord 4x2	ITP cables	ITP connector cable	Hybrid cable	Power cable		
											
		IE FC Standard Cable GP 4x2 (AWG22)	IE FC Standard Cable GP 4x2 (AWG24) IE FC Flexible Cable GP 4x2 (AWG24)	IE FC Standard Cable GP 2x2 IE FC Flexible Cable GP 2x2 IE FC Trailing Cable GP 2x2 IE FC Torsion Cable GP 2x2 IE FC Marine Cable 2x2	IE TP Cord 9/RJ45 IE TP XP Cord 9/RJ45 IE TP Cord 9-45/RJ45 IE TP XP Cord 9-45/RJ45 IE TP Cord RJ45/15 IE TP XP Cord RJ45/15 IE TP XP Cord 9/9	IE TP Cord RJ45/RJ45 IE TP XP Cord RJ45/RJ45	ITP Standard Cable ITP FRNC Cable	ITP Standard Cable 9/15 ITP XP Standard Cable 9/9 ITP XP Standard Cable 15/15 ITP FRNC Cable 9/15	Hybrid cable 2x2 + 4x0.34	Energy Cable 2 x 0.75 Energy Cable 5 x 1.5	
	IE FC RJ45 Modular Outlet	•			•			•			
	IE FC Outlet RJ45			•	•						
	IE FC RJ45 Plug 2x2			•							
	IE FC RJ45 Plug 4x2		•								
	M12 power connector	A-coded							•		
		D-coded		•							
	IP67 hybrid connector							•			
	ITP plug 9-pin/15-pin					•					
	IE devices with Sub-D connection			•			•				
	Devices with RJ45 connection			•	•						
	Power Plug PRO									•	
	7/8" plug-in connector									•	
	IE RJ45 Plug PRO			•							

G_IK10_XX_10245

PROFINET/Industrial Ethernet

Passive network components

Overview of passive network components

Overview (continued)

		Options for connecting Industrial Ethernet cables with plugs, terminals or devices						
		Optical						
		Fiber-optic cable 50/125 µm	Fiber-optic cable 62.5/125 µm	PCF fiber optic cable	Fiber-optic cable with BFOC connector	Fiber-optic cable with SC plug	POF-FOC 980/1000 µm	Fiber-optic cable with SC RJ plug
								
		FO Standard Cable GP FO Trailing Cable GP FO Ground Cable	FIBER OPTIC standard cable INDOOR Fiber Optic indoor cable Flexible Fiber Optic trailing cable SIENOPYR marine duplex fiber optic cable	PCF Standard Cable GP PCF Trailing Cable GP PCF Trailing Cable	Preassembled FOC with BFOC connector	Preassembled FOC with SC connector	POF Standard Cable GP POF Trailing Cable	Preassembled FOC with SC RJ connector
	BFOC connector	•	•					
	IE devices with BFOC connection				•			
	SC plug	•						
	IE devices with SC connection					•		
	SC RJ plug			•			•	
	IE devices with SC RJ connection							•
	IE SC RJ POF Plug PRO						•	
	IE SC RJ PCF Plug PRO			•				

G_IK10_XX_10246

PROFINET/Industrial Ethernet

Passive network components

Overview of Twisted Pair

Overview

Structured cabling

- Structured cabling to ISO IEC 118011/EN 50173 describes the non-application-specific, tree-like cabling of building complexes for IT purposes. A site is subdivided into the following areas:
 - Primary area (connecting the buildings of a site)
 - Secondary area (connecting the floors of a building)
 - Tertiary area (IT connection of data terminals on a floor)

The structured cabling that can be achieved with the Industrial Ethernet FastConnect System corresponds to the structure of the tertiary cabling in accordance with EN 50173 for Ethernet.

FastConnect Twisted Pair (FC)

- For structured cabling in the production hall, the FastConnect Twisted Pair cabling system is ideal. With the fast installation system for Industrial Ethernet, structured cabling from the office environment not only becomes industry compatible for installation in the production hall;
- FastConnect cables can also be assembled extremely quickly and easily on site. The RJ45 cabling technique, an existing standard, is also available in an industry-standard version that supports structured cabling (patch cables, patch field, installation cables, connection socket, connecting cable).
- With the IE FC RJ45 plug and FastConnect cables as an alternative to structured cabling, up to 100 m cable length can be achieved for a point-to-point link (requires less patch technology).

ITP (Sub-D connection method)

- For direct connection between stations and network components, the ITP Standard Cable is offered preassembled with Sub-D plugs as a rugged connection system. This allows cable lengths of up to 100 m to be achieved without the need for patches.

Benefits

- Extensive product range for flexible cabling in industry
- Faster connection of data terminals thanks to safe stripping of the outer sheath and braided shield in one step
- Easy connection method (insulation-piercing contacts) for 4-core (Cat5) and 8-core (Cat6) Industrial Ethernet FC Twisted Pair installation cables
- Easy assembly for all cable types with the preadjusted FC stripping tool
- Reliable shield contacting and strain relief

Application

	10/100 Mbit/s	10/100/1000 Mbit/s
IE FC TP Cable 2x2	●	—
IE FC TP Cable 4x2	—	●
IE FC RJ45 Plug 2x2	●	—
IE FC Plug 4x2	—	●
IE FC Outlet RJ45	●	—
IE FC RJ45 Modular Outlet	—	●
IE TP Cord	● ¹⁾	● ²⁾

¹⁾ All TP Cord types with a Sub-D interface

²⁾ IE TP Cord RJ45/RJ45 and IE TP Cord XP

UL approvals

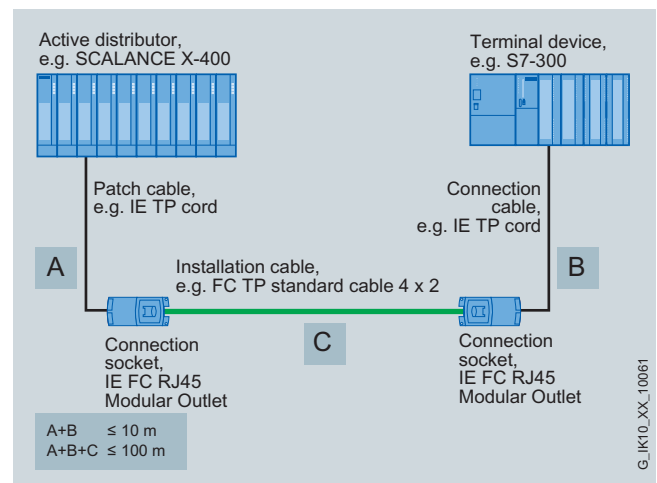
UL listing (safety standard) for network cables is especially necessary for the American and Canadian markets. The requirements for the appropriate approvals depend on where the cable is routed within the building. This applies to all cables which have to be routed from a machine to a remote control cabinet and are positioned on cable racks secured on the building. Cables with UL approval have "GP" (**G**eneral **P**urpose) added to their name.

Design

The FastConnect system comprises:

- Industrial Ethernet FastConnect cables** specially designed for fast connection (UL and CAT5e certified) as FC TP Standard, FC TP Flexible, FC TP Trailing, TP Torsion and FC TP Marine Cable.
- Easy stripping with the **FastConnect Stripping Tool**; the outer sheath and the braided shield are stripped accurately in one step
- The prepared cable is connected in the **FastConnect products** using the insulation displacement method.

Integration



Structured cabling to EN 50173

PROFINET/Industrial Ethernet

Passive network components

Industrial Ethernet FastConnect

Overview



- With the FastConnect (FC) system for Industrial Ethernet, structured cabling from the office environment becomes industry-compatible for installation in the production hall.
- Time-saving, error-free installation on-site
- RJ45 cabling technology is used as the permanent standard
- The ideal solution for installation of RJ45 connectors in the field area with 4-core (2 x 2) Industrial Ethernet FC cables
- The ideal solution for installation of IE FC RJ45 Modular Outlet on 8-core (4 x 2) Industrial Ethernet FC cables
- Reliable shield attachment and strain relief are integrated
- Mistakes are prevented thanks to color coding and the transparent contact cover
- Integrated system of FC plug-in connectors and an extensive FC cable spectrum with appropriate UL approvals

Benefits



- Comprehensive product range for flexible wiring in industry in accordance with the innovative Industrial Ethernet standard PROFINET (PROFINET Cabling and Interconnection Technology Guideline ¹⁾)
- Faster connection of data terminals thanks to safe stripping of the outer sheath and braided shield in one step
- Easy connection technique (insulation displacement contacts) for 4-core (Cat5) and 8-core (Cat6) Industrial Ethernet FC Twisted Pair installation cables
- Easy assembly of both cable types with the preadjusted FC stripping tool
- Reliable shield contact and strain relief thanks to bolt-on cover
- Excellent EMC shielding and deflection (metal housing)
- Mistakes are prevented thanks to color coding and the transparent contact cover
- RJ45 cabling technology is used as the permanent standard

¹⁾ Available as a download under www.profinet.com

PROFINET/Industrial Ethernet

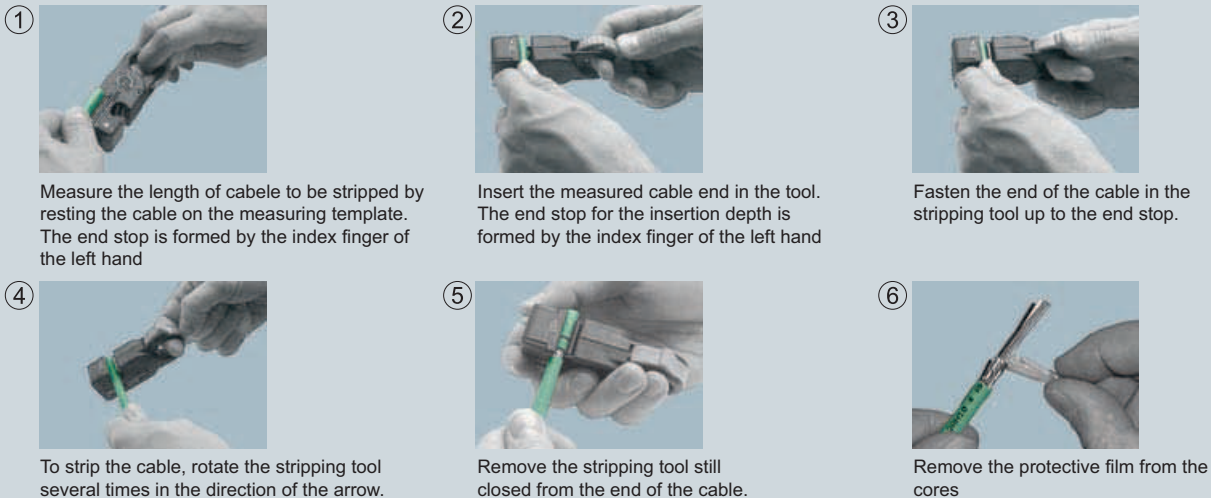
Passive network components

Industrial Ethernet FastConnect

Application

Industrial Ethernet FastConnect is a fast connection technique for easy assembly of 4-core and 8-core Industrial Ethernet FC cables.

After stripping the IE FC cable, it can be directly mounted either in the IE FC RJ45 Plug (4-core), the IE FC Outlet RJ45 (4-core) or the IE RJ45 Modular Outlet (8-core).



Design

The complete system:

- Industrial Ethernet FC installation cables designed for fast assembly; 4-core (2x2) Cat5e;
 - IE FC TP Standard Cable GP
 - IE FC TP Flexible Cable GP
 - IE FC TP Trailing Cable GP
 - IE FC TP Trailing Cable
 - IE TP Torsion Cable
 - IE FC TP Marine Cable
 - IE FC TP FRNC Cable GP
 - IE FC TP Food Cable
 - IE FC TP Festoon Cable GP
- 8-core (4 x 2) Cat6 certified, with appropriate UL approval:
 - IE FC TP Standard Cable GP (AWG 22/AWG 24)
 - IE FC TP Flexible Cable (AWG 24)
- User-friendly stripping technique with FC Stripping Tool
- FC RJ45 Plug immune to interference (10/100 Mbits/s). The rugged metal casing makes it an ideal solution for installing RJ45 plug-in connectors to 4-core IE FC cables at the field level.
- The prepared cable is connected in the Industrial Ethernet FC Outlet RJ45 (10/100 Mbits/s; 4-core) or IE FC RJ45 Modular Outlet (10/100/1000 Mbits/s; 8-core) using insulation displacement

Function

The FastConnect stripping technique supports fast and easy connection of the Industrial Ethernet FC cables

- IE FC RJ45 Plug (10/100/1000 Mbit/s)
- IE FC Outlet RJ45 (10/100 Mbit/s)
- IE FC RJ45 Modular Outlet (10/100/1000 Mbit/s)

The data terminals and network components are connected using outlets via TP Cords.

The Industrial Ethernet FastConnect cables are specially designed for use of the Industrial Ethernet FastConnect Stripping Tool, with which the outer insulation and the braided shield can be stripped accurately in one step. The prepared cable is then connected using insulation displacement.

Approvals

UL listing (safety standard) for network cables is especially necessary for the American and Canadian markets. The requirements for the appropriate approvals depend on where the cable is routed within the building. This applies to all cables which have to be routed from a machine to a remote control cabinet and are positioned on cable racks secured on the building. OFN/OFNG cable for routing in bundles (general purpose cable).

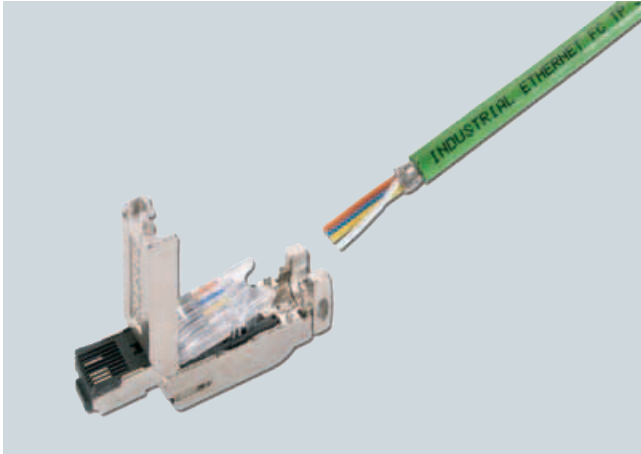
The various connectors and cables from the FastConnect cabling system can also be used in hazardous areas (EX-Zone 2). No special approval is necessary.

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Plug 2 x 2

Overview



- Implementation of direct device connections over distances of up to 100 m with Industrial Ethernet FC installation cable 2 x 2 without patching
- Easy connection (insulation displacement contacts) for 4-core Twisted Pair installation cables (100 Mbit/s) without the need for special tools
- Error-preventing connection technique thanks to visible connection area as well as colored blade terminals
- Industry-compatible design (rugged metal housing, no easily lost small parts)
- Excellent EMC shielding and deflection (metal housing)
- Integrated strain-relief for installation cables
- Compatible to the EN 50173 (RJ45) / ISO IEC 11801 standard
- Additional strain and bending relief of plug connector possible through latching of plug on device housing, e.g. with SCALANCE X, SCALANCE S, ET 200S.

Benefits



- Ideal solution for installing RJ45 plug-in connectors in the field level
- Time-saving, error-free installation using the FastConnect system
- RJ45 plug-in connector is resistant to interference thanks to the rugged metal housing
- Reliable shield attachment and strain relief are integrated
- Mistakes are prevented thanks to color coding and the transparent contact cover
- A compatible system of Industrial Ethernet FastConnect plug-in connectors and a comprehensive range of FastConnect cables with the appropriate UL approvals and PROFINET compatibility

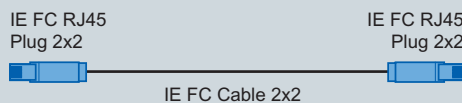
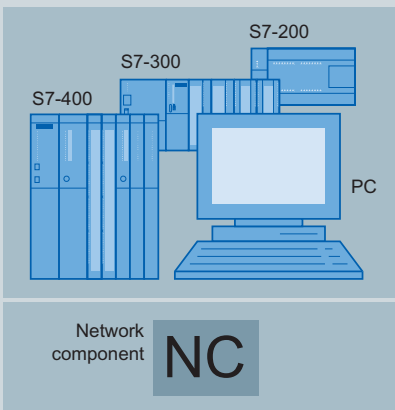
Application

The compact and rugged design of the plug-in connectors allow the FC RJ45 Plugs to be used in the industrial environment and in equipment from the office environment.

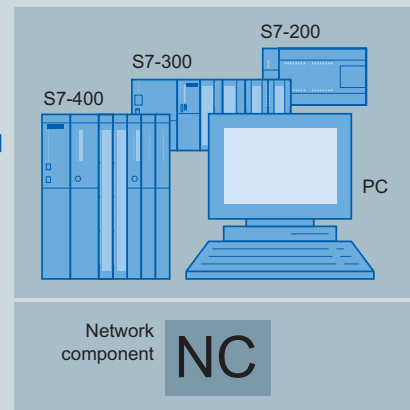
Industrial Ethernet FastConnect RJ45 Plugs support quick and easy installation of the Industrial Ethernet FastConnect installation cables 2 x 2 (4-core Twisted Pair cables) in the field.

The Industrial Ethernet FastConnect Stripping Tool for preparing the cable end (stripping the cable sleeve and shield in one action) supports easy handling and fast, error-free contacting of the cable at the plug-in connector. Installation is also possible under difficult working conditions because the plug-in connector does not have any small parts that can be lost.

The new plug-in connectors enable point-to-point links to be implemented (100 Mbit/s) for Industrial Ethernet between two data terminals/network components up to 100 m without the need for patches.



IE FC TP Standard Cable GP 2x2 (Type A)
 IE FC TP Flexible Cable GP 2x2 (Type B)
 IE FC TP Trailing Cable GP 2x2 (Type C)
 IE FC Torsion Cable 2x2 (Type C)
 IE FC TP Trailing Cable 2x2 (Type C)
 IE FC TP Marine Cable 2x2 (Type B)
 IE FC TP Food Cable 2x2 (Type C)
 IE FC TP FRNC Cable GP 2x2 (Type B)
 IE FC TP Festoon Cable GP 2x2 (Type B)



If components that do not support autocrossing are used, an IE TP XP cord must be used between two network components or terminals.

Use of FastConnect cables with IE FC RJ45 plug

G_K10_XX_10034

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Plug 2 x 2

Design

Industrial Ethernet FC RJ45 Plugs are available in three designs:

- With 180° (straight) cable outlet
- With 145° (angled) cable outlet (SIMOTION and SINAMICS, for example)
- With 90° (angled) cable outlet (e.g. for ET 200S)



They are used for optimized connection of Industrial Ethernet FastConnect cables to data terminals and network components. The plugs have a rugged, industry-compatible metal housing that provides optimum protection against faults in data communication.

The 4 integrated insulation displacement contacts make contacting of the FC cable variants easy and prevent mistakes.

After the stripped cable end has been inserted in the blade terminal (which has been hinged open), it is pressed down for reliable contacting of the conductors.

Thanks to their compactness, the plug-in connectors (IE FC Plug 180°) can be used on devices with individual sockets and on devices with multiple sockets (blocks).

①



Strip the IE FC cable 2x2 using stripping tool and fan out the wires according to color coding on the contact cover of the FC RJ45 plug.

②



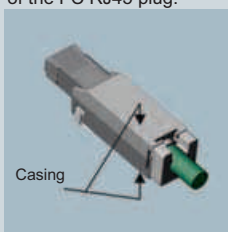
Open casing of the FC RJ45 plug and insert wires according to color coding as far as the end stop.

③



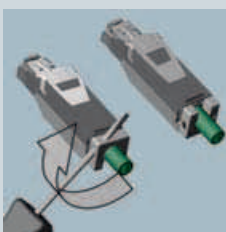
Press down contact cover to make contact with the wires.

④



Close casing cover and press together with lower connector casing.

⑤



Using a screwdriver, turn locking ring through 90° to ensure that cable is gripped tightly.

Data terminals with a suitable bracket on the housing provide additional tension and bending relief for the plug-in cable.

Function

The IE FC RJ45 Plugs are used to install uncrossed 100 Mbit/s Ethernet connections up to 100 m without the use of patches. Crossed cables can also be installed by swapping the transmit and receive pair in a plug.

When the housing is open, color markings on the contact cover make it easier to connect the cores to the blade terminals. The user can check that contact has been made correctly through the transparent plastic material of the contact cover.

G_IK10_XX_30026

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Plug 2 x 2

Technical specifications

Order No.	6GK1 901-1BB10-2AA0	6GK1 901-1BB20-2AA0	6GK1 901-1BB30-0AA0
Product type description	IE FC RJ45 Plug 180 2 x 2	IE FC RJ45 Plug 90 2 x 2	IE FC RJ45 Plug 145 2 x 2
Number of electrical connections			
• For Industrial Ethernet FC TP cables	4	4	4
• For network components or terminals	1	1	1
Electrical connection version			
• FastConnect	Yes	Yes	Yes
• For Industrial Ethernet FC TP cables	Integrated insulation displacement contacts	Integrated insulation displacement contacts	Integrated insulation displacement contacts
• For network components or terminal	RJ45 connector	RJ45 connector	RJ45 connector
Transmission rate for Cat5e	100 Mbit/s	100 Mbit/s	100 Mbit/s
Ambient temperature			
• During operation	-20 ... +70 °C	-20 ... +70 °C	-20 ... +70 °C
• During storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
• During transport	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Max. relative humidity during operation	95%	95%	95%
Width	13.7 mm	13.7 mm	13.9 mm
Height	16 mm	16 mm	16 mm
Depth	55 mm	42 mm	55.6 mm
Assembly	IE FC stripping tool for stripping the IE FC cable	IE FC stripping tool for stripping the IE FC cable	IE FC stripping tool for stripping the IE FC cable
Net weight	35 g	35 g	35 g
IP degree of protection	IP20	IP20	IP20

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Plug 2 x 2

2

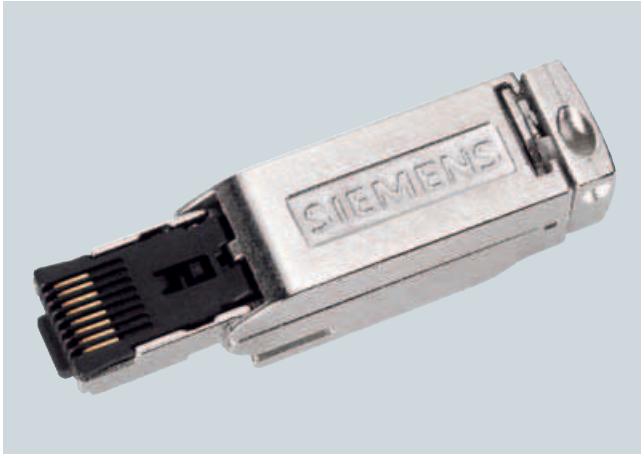
Ordering data	Order No.	Order No.
IE FC RJ45 plugs RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables		
IE FC RJ45 Plug 180 180° cable outlet; for network components and CPUs/CPUs with Industrial Ethernet interface <ul style="list-style-type: none"> 1 pack = 1 item 1 pack = 10 items 1 pack = 50 items 	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0	
IE FC RJ45 Plug 90 90° cable outlet; e.g. for ET 200S <ul style="list-style-type: none"> 1 pack = 1 item 1 pack = 10 units 1 pack = 50 units 	6GK1 901-1BB20-2AA0 6GK1 901-1BB20-2AB0 6GK1 901-1BB20-2AE0	
IE FC RJ45 Plug 145 145° cable outlet; e.g. for SIMOTION and SINAMICS <ul style="list-style-type: none"> 1 pack = 1 item 1 pack = 10 units 1 pack = 50 units 	6GK1 901-1BB30-0AA0 6GK1 901-1BB30-0AB0 6GK1 901-1BB30-0AE0	
IE FC stripping tool Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables	6GK1 901-1GA00	
IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; <u>Sold by the meter</u> max. quantity 1,000 m; minimum order 20 m <u>Preferred length</u> <ul style="list-style-type: none"> 1000 m 	6XV1 840-2AH10 6XV1 840-2AU10	
IE FC TP Flexible Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m	6XV1 870-2B	
IE FC TP Trailing Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use in trailing cables; PROFINET-compatible; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m	6XV1 870-2D	
IE FC TP Trailing Cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use in trailing cables; PROFINET-compatible; without UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m		6XV1 840-3AH10
IE TP Torsion Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use with robots; PROFINET-compatible; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m		6XV1 870-2F
IE FC TP Marine Cable 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90; marine approval; max. quantity 1000 m, minimum order 20 m		6XV1 840-4AH10
IE FC TP FRNC Cable GP 2 x 2 (Type B) 4-core, shielded, halogen-free TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m		6XV1 871-2F
IE FC TP Festoon Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use in festoon applications; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m		6XV1 871-2S
IE FC TP Food Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for the food and beverages industry; PROFINET-compliant; sold by the meter; max. length 1000 m, minimum order 20 m		6XV1 871-2L
IE FC Blade Cassettes (5 mm) Replacement blade cassette for the Industrial Ethernet stripping tool; for use with IE FC RJ45 Plugs and Modular Outlet, 5 items		6GK1 901-1GB01

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Plug 4 x 2

Overview



- Implementation of direct device connections of up to 60 m with Industrial Ethernet FC installation cable 4 x 2 without using patch technology
- Easy connection (insulation displacement contacts) for 8-core twisted pair installation cables (10/100/1000 Mbit/s) without the need for special tools
- Error-minimizing connection technique thanks to visible connection area as well as colored insulation displacement termination
- Industry-compatible design (rugged metal housing, no easily lost small parts)
- Excellent EMC shielding and deflection (metal housing)
- Integrated strain-relief for installation cables
- Compatible with the EN 50173 (RJ45) / ISO IEC 11801 standard
- Additional strain and bending relief of plug connector possible through latching of plug on device housing, e.g. with SCALANCE X, SCALANCE S.

Benefits



- Ideal solution for installation of RJ45 plugs in the field
- Time-saving, error-free installation due to FastConnect system; no easily lost small parts
- Noise-resistant RJ45 plug connector due to rugged metal housing
- Reliable shield attachment and strain relief are integrated
- Mistakes are prevented thanks to color coding and the transparent contact cover
- Coordinated system comprising Industrial Ethernet FastConnect plug-in connectors and an extensive range of FastConnect cables with corresponding UL approvals

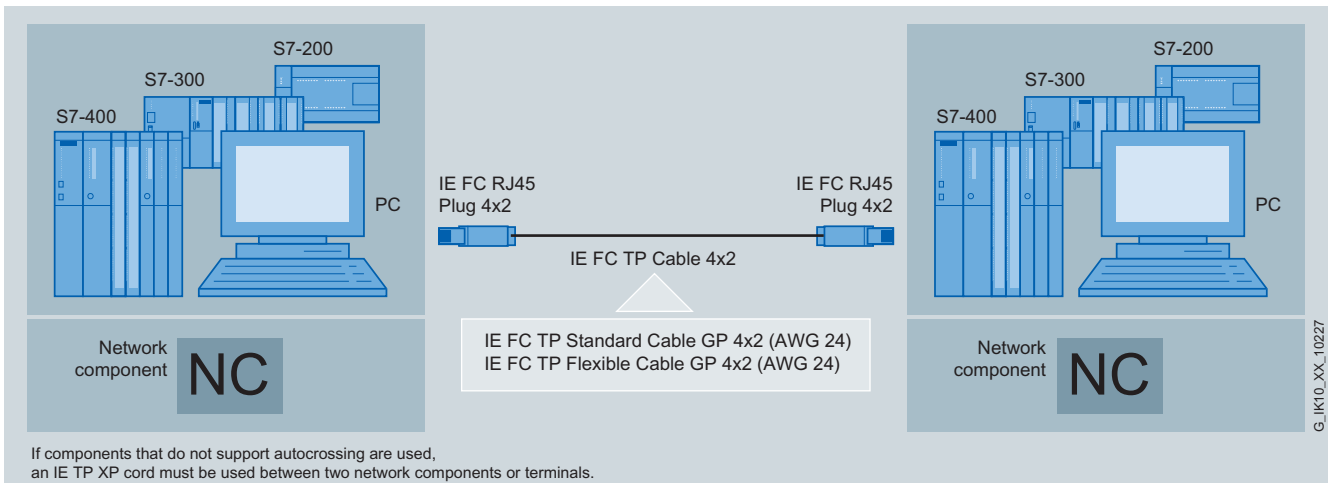
Application

The compact, rugged design of the connectors makes the FC RJ45 Plug suitable for use in both industrial environments and on office equipment.

The Industrial Ethernet FastConnect RJ45 Plug 4 x 2 permits quick and easy installation of the Industrial Ethernet FastConnect installation cables 4 x 2 (8-core twisted pair cables) in the field.

The Industrial Ethernet FastConnect Stripping Tool for preparing the end of a cable (stripping the jacket and shield in one step) allows simple handling and fast, reliable fitting of the cable connector to the cable. As all the cable connector parts are captive, it can also be fitted in difficult conditions.

The new plug-in connector enables point-to-point links to be implemented (10/100/1000 Mbit/s) for Industrial Ethernet between two data terminals/network components up to 60 m apart without the need for patches.



Use of FastConnect cables 4 x 2 with IE FC RJ45 plug 4 x 2

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Plug 4 x 2

Design

The Industrial Ethernet FC RJ45 Plug 4 x 2 is available with a 180° (straight) cable outlet.

It is the ideal method of connecting an Industrial Ethernet Fast-Connect cable to data terminals and network components. The plug has a rugged, industry-compatible metal housing that provides optimum protection against faults in data communication.

The eight integrated insulation displacement contacts make contacting of the FC cable variants 4 x 2 and 2 x 2 easy and prevent mistakes. After the stripped cable end has been inserted in the insulation displacement terminals, the conductors make contact when the casing is closed.

Owing to their compact size, the plug connectors can be used both on devices with individual jacks and on devices with multi-ple jacks (blocks).

Data terminals with a suitable bracket on the housing provide additional tension and bending relief for the plug-in cable.

Function

The IE FC RJ45 Plug 4 x 2 is used to install uncrossed 10/100/1000 Mbit/s Ethernet connections up to 60 m without the use of patches. Crossed cables can also be installed by swapping the transmit and receive pair in a plug.

With the casing open, colored markers on the contact element make it simple to connect the cores to the insulation displacement contacts. The transparent synthetic material of the contact element allows users to check the contacts themselves.

Technical specifications

Order No.	6GK1 901-1BB11-2AA0
Product type description	IE FC RJ45 Plug 4 x 2
Number of electrical connections	
• for Industrial Ethernet FC TP cables	8
• for network components or terminals	1
Electrical connection version	
• FastConnect	Yes
• for Industrial Ethernet FC TP cables	integrated insulation displacement contacts
• for network components or terminals	RJ45 connector
Transmission rate for Cat6	10/100/1000 Mbit/s
Ambient temperature	
• during operating phase	-20 ... +70 °C
• during storage	-40 ... +80 °C
• during transport	-40 ... +80 °C
Max. relative humidity during operating phase	95 %
Width	13.7 mm
Height	16 mm
Depth	55 mm
Assembly	IE FC stripping tool for stripping the IE FC cable
Net weight	35 g
Degree of protection	IP20

Ordering data

Order No.

IE FC RJ45 Plug 4 x 2

RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB11-2AA0
6GK1 901-1BB11-2AB0
6GK1 901-1BB11-2AE0

IE FC stripping tool

Pre-adjusted stripping tool for fast stripping of Industrial Ethernet FC cables

6GK1 901-1GA00

IE FC TP Standard Cable GP 4 x 2

8-core, shielded TP installation cable for universal applications; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m

- AWG 22, for connection to IE FC RJ45 Modular Outlet
- AWG 24, for connection to IE FC RJ45 Plug 4 x 2

6XV1 870-2E

6XV1 878-2A

IE FC TP Flexible Cable GP 4 x 2

8-core, shielded TP installation cable for occasional movement; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m

- AWG 24, for connection to IE FC RJ45 Plug 4 x 2

6XV1 878-2B

IE FC blade cassettes (5 mm)

Replacement blade cassette for the Industrial Ethernet stripping tool; for use with IE FC RJ45 Plugs and Modular Outlet, 5 units

6GK1 901-1GB01

PROFINET/Industrial Ethernet

Passive network components

IE Push Pull Plug PRO

Overview



- Data plug-in connectors suitable for on-site assembly for IE FC TP and POF/PCF cables for transmitting data up to 100 Mbit/s
- Power plug-in connector suitable for on-site assembly for transmitting 2 x 24 V between Industrial Ethernet stations
- Degree of protection IP65/67
- The plug-in connectors make contact using a push-pull mechanism.

IE RJ45 Plug PRO

- Industrial Ethernet RJ45 plug-in connector suitable for on-site assembly for SCALANCE X-200IRT PRO and SIMATIC ET200pro switches
- Simple connection (insulation displacement contacts) for 4-core Twisted Pair FC installation cables (100 Mbit/s) without special tool
- Industrial design (rugged plastic housing)
- Good EMC shielding and discharge

IE SC RJ Plug PRO

- Industrial Ethernet SC RJ plug-in connector suitable for on-site assembly of:
 - POF cables for SCALANCE X-200IRT PRO and SIMATIC ET200pro switches
 - PCF cables for SCALANCE X-200IRT PRO switches
- Industrial design (rugged plastic housing)

Power Plug PRO

- 5-pole power plug-in connector suitable for on-site assembly, for 2 x 24 V voltage supply of the SCALANCE X-200IRT PRO and SIMATIC ET200pro switches

Benefits



- Simple and flexible assembly on site for application-specific plug-in cables through data and power plug-in connectors suitable for on-site assembly in degree of protection IP65/67

Application

IE RJ45 Plug PRO and IE SC RJ Plug PRO (POF or PCF) are plug-in connectors with push-pull terminal connection that, due to their high degree of protection (IP65/67), are used together with corresponding terminal equipment and network components in a high degree of protection in cabinet-free systems. Their silicon-free design enables them to also be used in the automobile industry, e.g. in paint shops.

PROFINET/Industrial Ethernet

Passive network components

IE Push Pull Plug PRO

Technical specifications

Order No.	6GK1 901-1BB10-6AA0	6GK1 900-0MB00-6AA0	6GK1 900-0NB00-6AA0	6GK1 907-0AB10-6AA0
Product type description	IE RJ45 Plug PRO	IE SC RJ POF Plug PRO	IE SC RJ PCF Plug PRO	Power Plug PRO
Number of electrical connections				
• for Industrial Ethernet FC TP cables	4	-	-	-
• for network components or terminals	1	1	1	1
Electrical connection version				
• FastConnect	-	-	-	-
• for Industrial Ethernet FC TP cables	Integrated insulation displacement contacts	SC RJ contact	SC RJ contact	Spring-loaded contact
• for network components or terminals	RJ45 connector	SC RJ plug	SC RJ plug	Power contact+ 1 FE
Transmission rate for Cat5e	100 Mbit/s	100 Mbit/s	100 Mbit/s	-
Ambient temperature				
• during operation	-40 ... +70 °C	-40 ... +70 °C	-40 ... +70 °C	-40 ... +70 °C
• during storage	-40 ... +70 °C	-40 ... +70 °C	-40 ... +70 °C	-40 ... +70 °C
• during transport	-40 ... +70 °C	-40 ... +70 °C	-40 ... +70 °C	-40 ... +70 °C
Max. relative humidity during operation	-	-	-	-
Width	30 mm	30 mm	30 mm	36 mm
Height	22 mm	22 mm	22 mm	30 mm
Depth	67.7 mm	62.5 mm	62.5 mm	66.3 mm
Net weight	68.8 g	63.5 g	63.5 g	83.1 g
Degree of protection	IP65/67	IP65/67	IP65/67	IP65/67

Ordering data

Order No.	Order No.
IE RJ45 Plug PRO RJ45 plug-in connector suitable for on-site assembly in degree of protection IP65/67; plastic casing, insulation displacement technology, for SCALANCE X-200IRT PRO and SIMATIC ET 200pro switches; 1 package = 1 unit	6GK1 901-1BB10-6AA0
IE SC RJ POF Plug PRO SC RJ plug-in connector suitable for on-site assembly in degree of protection IP65/67 for POF fiber optic cables; plastic housing, for SCALANCE X-200IRT PRO and SIMATIC ET 200pro switches; 1 package = 1 unit	6GK1 900-0MB00-6AA0
IE SC RJ PCF Plug PRO SC RJ plug-in connector suitable for on-site assembly in degree of protection IP65/67 for PCF fiber optic cables; plastic housing, for SCALANCE X-200IRT PRO switches; 1 package = 1 unit	6GK1 900-0NB00-6AA0
Power Plug PRO 5-pole power plug-in connector suitable for on-site assembly in degree of protection IP65/67 for 2 x 24 V voltage supply; plastic housing, for SCALANCE X-200IRT PRO and SIMATIC ET 200pro switches; 1 package = 1 unit	6GK1 907-0AB10-6AA0
IE FC TP cables	
IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 840-2AH10
IE FC TP Flexible Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2B
IE FC TP Trailing Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2D

PROFINET/Industrial Ethernet

Passive network components

IE Push Pull Plug PRO

2

Ordering data	Order No.	Order No.
IE FC TP cables (continued)		
IE FC TP Trailing Cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 840-3AH10	
IE TP Torsion Cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use with robots; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2F	
IE FC TP Marine Cable 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90; marine approval; max. length 1000 m, minimum order 20 m	6XV1 840-4AH10	
IE FC TP Food Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for the food and beverages industry; PROFINET-compatible; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 871-2L	
IE FC TP Festoon Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use in festoon applications; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 871-2S	
IE FC TP FRNC Cable GP 2 x 2 (Type B) 4-core, shielded, halogen-free TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 871-2F	
FO cables		
POF Standard Cable GP 980/1000 POF standard cable for permanent installation indoors using a PVC sheath; <u>sold by the meter</u>	6XV1 874-2A	
POF Trailing Cable 980/1000 POF trailing cable for use in cable carriers, with rugged PUR sheath; <u>sold by the meter</u>	6XV1 874-2B	
PCF Standard Cable GP 200/230 Standard cable, segmentable, <u>sold by the meter</u> ; max. length 2000 m; minimum order quantity 20 m;	6XV1 861-2A	
PCF Trailing Cable 200/230 Trailing cable, segmentable, <u>sold by the meter</u> ; max. length 2000 m; minimum order quantity 20 m;	6XV1 861-2C	
POF Trailing Cable GP 200/230 Trailing cable, segmentable, <u>sold by the meter</u> ; max. length 2000 m; minimum order quantity 20 m;	6XV1 861-2D	
Power cables		
Energy Cable 5 x 1.5 Trailable power cable with 5 copper cores (1.5 mm ²) for connecting to 7/8" plug-in connectors; <u>sold by the meter</u> ; max. length 1000 m; minimum order 20 m	6XV1 830-8AH10	
PROFINET Cabling and Interconnection Technology Guideline	See http://www.profinet.com	
Note: You can order additional components for the SIMATIC NET cable line from your local contact. For technical advice please contact : J. Hertlein, A&D SE PS Tel.: +49(0)911/750 44 65 Fax. +49(0)911/750 99 91 E-mail: juergen.hertlein@siemens.com		

PROFINET/Industrial Ethernet

Passive network components

IE Connecting Cable M12-180/M12-180/ IE FC M12 Plug PRO

Overview



Flexible connecting cables and FastConnect (FC) plug-in connectors that can be assembled in the field for transmission of data (up to 100 Mbit/s) between Industrial Ethernet stations with degree of protection IP65

Industrial Ethernet connecting cable M12-180/M12-180 (D-coded)

- Pre-assembled connecting cable (IE FC TP trailing cable GP) for connecting Industrial Ethernet stations (e.g. SIMATIC ET 200pro and SCALANCE X208PRO) with degree of protection IP65/IP67
- For transmission rates 10/100 Mbit/s

Industrial Ethernet FC M12 Plug PRO (D-coded)

- Industrial Ethernet M12 plug-in connector with FastConnect connection system for on-site assembly for SCALANCE X208PRO and IM 154-4 PN
- Easy connection (insulation displacement contacts) for 4-core twisted pair FC installation cables (100 Mbit/s) without the need for special tools
- Fault-preventing connection method thanks to visible contacting area and color-coded insulation piercing connecting devices
- Industry-compatible design (rugged metal housing)
- Excellent EMC shielding and deflection (metal housing)
- Integrated strain-relief for installation cables

Industrial Ethernet panel feedthrough

- Control cabinet feedthrough for conversion from M12 connection method (D coded, IP65/IP67) to RJ45 connection method (IP20)

Benefits



- Time-saving and fault-free connection of terminal stations by means of pre-fabricated connection cables
- Easy installation on-site for application-specific M12 plug-in cables by means of FastConnect M12 plug-in connectors (IE FC M12 Plug PRO, D-coded) that can be assembled in the field
- Reliable screen contact and strain relief are integrated
- Harmonized system made up of Industrial Ethernet FastConnect plug-in connectors and an extensive range of FastConnect cables with corresponding UL approvals and PROFINET conformity

Technical specifications

Order No.	6GK1 901-0DB20-6AA0
Product type description	IE FC M12 Plug PRO
Number of electrical connections	
• for Industrial Ethernet FC TP cables	4
• for network components or terminals	1
Electrical connection version	
• FastConnect	Yes
• for Industrial Ethernet FC TP cables	integrated insulation displacement contacts
• for network components or terminal	M12 connector (D-coded)
Transmission rate for Cat5e	10/100 Mbit/s
Ambient temperature	
• during operating phase	-40 ... +85 °C
• during storage	-40 ... +85 °C
• during transport	-40 ... +85 °C
Max. relative humidity during operating phase	95%
Width	19 mm
Height	19 mm
Depth	73 mm
Net weight	40 g
Degree of protection	IP65/67

Ordering data

Ordering data	Order No.
IE Connecting Cable M12-180/M12-180	
Pre-assembled IE FC TP Trailing Cable GP 2 x 2 (PROFINET Type C) with two 4-pin M12 connectors (D-coded) up to 85 m, degree of protection IP65/IP67 Length:	
• 0.3 m	6XV1 870-8AE30
• 0.5 m	6XV1 870-8AE50
• 1.0 m	6XV1 870-8AH10
• 1.5 m	6XV1 870-8AH15
• 2.0 m	6XV1 870-8AH20
• 3.0 m	6XV1 870-8AH30
• 5.0 m	6XV1 870-8AH50
• 10 m	6XV1 870-8AN10
• 15 m	6XV1 870-8AN15
Additional special lengths with 90° or 180° cable outlet	See http://support.automation.siemens.com/WW/view/en/26999294
IE FC M12 Plug PRO	
M12 plug-in connector (D-coded, IP65/IP67) that can be assembled in the field, metal enclosure, FastConnect connection method, for SCALANCE X208PRO and IM 154-4 PN	
• 1 items	6GK1 901-0DB20-6AA0
• 8 items	6GK1 901-0DB20-6AA8

Ordering data (continued)	Order No.		Order No.
IE panel feedthrough Control cabinet feedthrough for conversion from M12 connection method (D coded, IP65/IP67) to RJ45 connection method (IP20) • 1 pack = 5 items	6GK1 901-0DM20-2AA5	IE FC TP Marine Cable 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90; marine approval; sold by the meter, max. length 1000 m, minimum order 20 m	6XV1 840-4AH10
IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC outlet RJ45/ IE FC RJ45 plug; PROFINET-compliant; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m	6XV1 840-2AH10	IE FC TP Trailing Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2D
IE FC TP Flexible Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2B	IE FC TP Festoon Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/IE FC RJ45 Plug 180/90 for use in festoon applications; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 871-2S
IE FC TP Trailing Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use as trailing cable; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2D	IE FC TP Food Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/IE FC RJ45 Plug 180/90 for use in festoon applications; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 871-2L
IE FC TP Trailing Cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use in trailing cables; PROFINET-compatible; without UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 840-3AH10	IE FC stripping tool Pre-adjusted stripping tool for the fast stripping of Industrial Ethernet FC cables	6GK1 901-1GA00
IE TP Torsion Cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use with robots; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order length 20 m	6XV1 870-2F	IE FC blade cassettes (5 mm) Replacement blade cassette for the Industrial Ethernet stripping tool; for use with IE FC RJ45 Plugs and IE FC RJ45 Modular Outlet, 5 units	6GK1 901-1GB01
		PROFINET Cabling and Interconnection Technology Guideline	See http://www.profinet.com

Note:

Additional components of the SIMATIC NET wiring range can be ordered from your local contact person.

For technical advice contact:

J. Hertlein, A&D SE PS

Tel.: +49(0)911/750 44 65

Fax.: +49(0)911/750 99 91

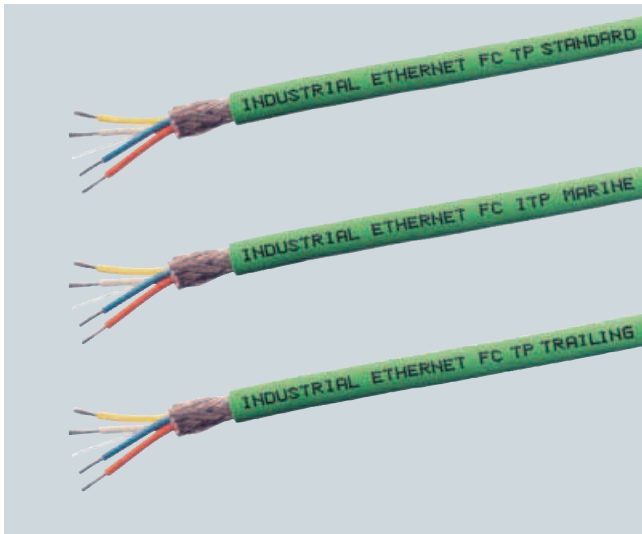
E-mail: juergen.hertlein@siemens.com

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 2 x 2

Overview



- For structured cabling in the factory hall; specially designed for fast assembly
- Easy stripping with the FastConnect Stripping Tool; the outer sheath and the braided shield are stripped accurately in one step
- Connection to FastConnect products using insulation displacement
- Exceeds Category 5 (Cat5e) of the international cabling standards ISO/IEC 11801 and EN 50173
- PROFINET-compatible
- UL approval
- Different variants for different applications
 - IE FC TP Standard Cable GP
 - IE FC TP Flexible Cable GP
 - IE FC TP FRNC Cable GP
 - IE FC TP Trailing Cable GP
 - IE FC TP Trailing Cable
 - IE FC TP Festoon Cable
 - IE FC TP Festoon Cable GP
 - IE TP Torsion Cable
 - IE FC TP Food Cable
 - IE FC TP Marine Cable
- High interference immunity thanks to double shielding
- Easy length measurement thanks to printed meter markings

Benefits



- Time-saving due to simple and quick assembly with FastConnect cables 2 x 2 to Industrial Ethernet FC outlet RJ45 (10/100 Mbit/s) or Industrial Ethernet FC RJ45 plug 180/90.
- Time-saving due to simple and quick assembly with FastConnect cables 2 x 2 to Industrial Ethernet FC RJ45 plugs.
- Versatile application due to special bus cables
- Noise immune network due to double-shielded cables and integrated grounding concept.
- Silicone-free and therefore suitable for use in the automotive industry (for example in paint shops)

Application

For the construction of Industrial Ethernet networks (4-core), different cable types are offered to suit the different types of application.

In general, the listed Industrial Ethernet FC cables IE FC Cable 2 x 2 must be used.

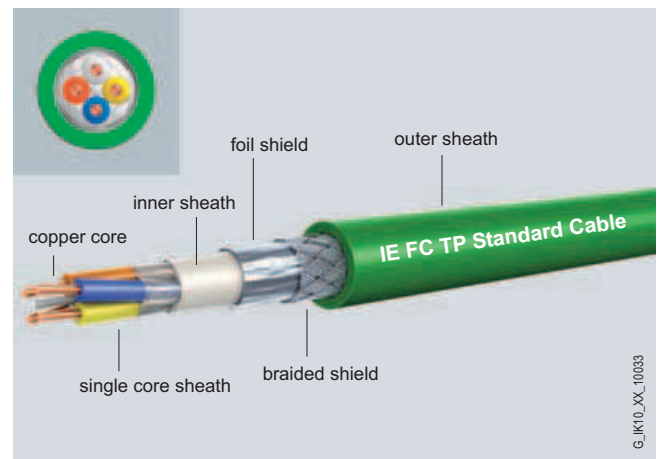
Note:

You will find other specifications of the network topology in the manual for TP and fiber optic networks.

UL approvals

Different cable versions are offered with appropriate UL approvals for laying in cable bundles and cable racks according to the specifications of NEC (National Electrical Code) Article 800/725. These are identified as GP (General Purpose).

Design



The FastConnect (FC) Industrial Ethernet cables IE FC Cable 2 x 2 are designed with radial symmetry and therefore allow the use of the FC Stripping Tool. The IE FC Outlet RJ45 and the IE FC RJ45 Plug can therefore be attached quickly and easily.

- The double shield makes it especially suitable for routing through industrial areas with strong electro-magnetic fields
- Easy connection to the insulation displacement contacts of the FC RJ45 plug without the need for special tools
- System-wide grounding concept can be implemented through the outer shield of the bus cable as well as through the grounding concept of the IE FC Outlet RJ45 and the IE FC RJ45 Plugs
- Printed meter marks

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 2 x 2

Design (continued)

Cable types

- **IE FC TP Standard Cable GP 2 x 2:**
Standard bus cable with rigid cores specially designed for fast installation;
four rigid cores connected in a four-branch star
- **IE FC TP Flexible Cable GP 2 x 2:**
Flexible bus cable for the special application of occasional motion control; four stranded cores connected in a four branch star
- **IE FC TP FRNC Cable GP 2 x 2:**
Flexible, halogen-free cable for use in buildings (FRNC= Flame Retardant Non Corrosive); four conductors (flexible leads) stranded into star-quad for occasional movement
- **IE FC TP Trailing Cable GP / IE FC TP Trailing Cable 2 x 2:**
Highly flexible bus cable for the special application of constant motion control in a cable carrier, e.g. for continuously moving machine parts; four stranded cores connected in a four branch star
- **IE FC Festoon Cable GP 2 x 2:**
Flexible cable for special use in constant movement in a cable trail/festoon arrangement, e.g. on crane systems; four cores (stranded) in twisted quads
- **IE TP Torsion Cable 2 x 2:**
Highly flexible bus cable for the special application of continuous motion control, e.g. for use with robots; stranded cores
- **IE FC TP Food Cable 2 x 2:**
Flexible cable for special use in the food and beverages industry;
four cores (stranded) in twisted quads
- **IE FC TP Marine Cable 2 x 2:**
Bus cable for marine applications; four cores (stranded) connected in a four branch star, halogen-free, certified for marine applications

Product overview IE FC TP Cable 2 x 2

(PROFINET-compatible according to "PROFINET Cabling and Interconnection Technology Guideline"¹⁾)

	PROFINET Type A	PROFINET Type B	PROFINET Type C
	AWG 22/1 rigid laying	AWG 22/7 flexible cable for occasional movement	AWG 22 highly flexible cable for continuous motion, e.g. cable carrier or robots
IE FC TP Standard Cable GP 2 x 2 (Type A) 6XV1 840-2AH10	●	—	—
IE FC TP Flexible Cable GP 2 x 2 (Type B) 6XV1 870-2B	—	●	—
IE FC TP FRNC Cable GP 2 x 2 (Type B) 6XV1 871-2F)	—	●	—
IE FC TP Trailing Cable GP 2 x 2 (Type C) 6XV1 870-2D	—	●	●
IE FC TP Trailing Cable 2 x 2 (Type C) 6XV1 840-3AH10	—	—	●
IE FC TP Festoon Cable GP 2 x 2 (Type B) 6XV1871-2S	—	●	—
IE TP Torsion Cable 2 x 2 (Type C) 6XV1 870-2F	—	—	●
IE FC TP Food Cable 2 x 2 (Type C) 6XV1871-2L	—	—	●
IE FC TP Marine Cable 2 x 2 (Type B) 6XV1 840-4AH10	—	●	—

¹⁾ Available as a download under <http://www.profinet.com>

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 2 x 2

Technical specifications

Order No.	6XV1 840-2AH10	6XV1 870-2B	6XV1 870-2D
Product type description	IE FC Standard Cable GP 2 x 2 (Type A)	IE FC Flexible Cable GP 2 x 2 (Type A)	IE FC Trailing Cable GP 2 x 2 (Type C)
Suitability for use	All-purpose	Occasional movement	In cable carriers
Cable name	2YY (ST) CY 2x2x0.64/1.5-100 GN	2YY (ST) CY 2x2x0.75/1.5-100 LI GN	2YY (ST) CY 2x2x0.75/1.5-100 LI GN
Standard for structured cabling	Cat5e	Cat5e	Cat5e
Electrical data			
Attenuation measurement per length			
• at 10 MHz	5.2 dB/100 m	6.0 dB/100 m	6.3 dB/100 m
• at 100 MHz	19.5 dB/100 m	21.0 dB/100 m	21.3 dB/100 m
Characteristic impedance at 1 MHz ... 100 MHz	100 Ω	100 Ω	100 Ω
• Relative symmetrical tolerance of characteristic impedance at 1 MHz ... 100 MHz	± 15%	± 15%	± 15%
Near-end crosstalk attenuation per length at 1 MHz ... 100 MHz	50.0 dB/100 m	50.0 dB/100 m	50.0 dB/100 m
Surface transfer impedance at 10 MHz	10 mOhm/m	20 mOhm/m	20 mOhm/m
Loop resistance per length	115 Ohm/km	120 Ohm/km	120 Ohm/km
Coefficient of insulation resistance	500 MOhm *km	500 MOhm *km	500 MOhm *km
Mechanical data			
Outer diameter			
• of the inner conductor	0,64 mm	0,75 mm	0,75 mm
• AWG cross-section	AWG 22	AWG 22	AWG 22
• of the wire insulation	1.5 mm	1.5 mm	1.5 mm
• of the inner sheath of the cable	3.9 mm	3.9 mm	3.9 mm
• of the cable sheath	6.5 mm	6.5 mm	6.5 mm
• Symmetrical tolerance of the outer diameter of the cable sheath	0.2 mm	0.2 mm	0.2 mm
Ambient temperature			
• during operation	-40 ... +70 °C	-25 ... +70 °C	-10 ... +70 °C
• during transport	-40 ... +70 °C	-25 ... +70 °C	-25 ... +75 °C
• during storage	-40 ... +70 °C	-25 ... +70 °C	-25 ... +75 °C
• during installation	-20 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C
Bending radius			
• for one-off bending	19.5 mm	32.5 mm	32.5 mm
• for repeated bending	49 mm	52 mm	49 mm
Number of bending cycles	-	-	3000000
Tensile load, max.	150 N	150 N	150 N
Weight per length	67 kg/km	68 kg/km	68 kg/km
Fire behavior	Flame retardant to UL 1685 (CSA FT 4)	Flame retardant to UL 1685 (CSA FT 4)	Flame retardant to UL 1685 (CSA FT 4)
Chemical resistance to mineral oil	conditional resistance	conditional resistance	conditional resistance
Radiological resistance to UV radiation	resistant	resistant	resistant
Product property			
• halogen-free	No	No	No
• Silicone-free	Yes	Yes	Yes
FastConnect electrical connection version	Yes	Yes	Yes
UL listing at 300 V rating	Yes/CM/SMG/PLTC/Sun Res	Yes/CM/CMG/PLTC/Sun Res	Yes/CMG/PLTC/Sun Res
UL style at 600 V rating	Yes	No	Yes
Marine classification association	-	-	-

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 2 x 2

Technical specifications (continued)

Order No.	6XV1 870-2F	6XV1 840-3AH10	6XV1 840-4AH10
Product type description	IE TP Torsion Cable 2 x 2 (Type C)	IE FC Trailing Cable 2 x 2 (Type C)	IE FC Marine Cable 2 x 2 (Type B)
Suitability for use	Use with robots	In cable carriers	Marine and offshore use
Cable name	02YS C11Y 1 x 4 x 0.75/1.5-100LI GN VZN FRNC	2YH (ST) C11Y 2 x 2 x 0.75/1.5-100 LI GN VZN FRNC	L-9YH (ST) CH 2 x 2 x 0.34/1.5-100 GN VZN FRNC
Standard for structured cabling	Cat5e	Cat5e	Cat5e
Electrical data			
Attenuation measurement per length			
• at 10 MHz	8.1 dB/100 m	6.0 dB/100 m	6.0 dB/100 m
• at 100 MHz	41.0 dB/100 m	22.0 dB/100 m	22.0 dB/100 m
Characteristic impedance at 1 MHz ... 100 MHz	100 Ω	100 Ω	100 Ω
• Relative symmetrical tolerance of characteristic impedance at 1 MHz ... 100 MHz	± 15%	± 15%	± 15%
Near-end crosstalk attenuation per length at 1 MHz ... 100 MHz	50.0 dB/100 m	50.0 dB/100 m	50.0 dB/100 m
Surface transfer impedance at 10 MHz	100 mOhm/m	10 mOhm/m	10 mOhm/m
Loop resistance per length	120 Ohm/km	120 Ohm/km	120 Ohm/km
Coefficient of insulation resistance	500 MOhm *km	500 MOhm *km	500 MOhm *km
Mechanical data			
Outer diameter			
• of the inner conductor	0.76 mm	0.75 mm	0.75 mm
• of the wire insulation	1.5 mm	1.5 mm	1.5 mm
• of the inner sheath of the cable	4.6 mm	3.9 mm	3.9 mm
• of the cable sheath	6.5 mm	6.5 mm	6.5 mm
• symmetrical tolerance of the outer diameter of the cable sheath	0.2 mm	0.2 mm	0.2 mm
Material			
• of the wire insulation	PE	PE	PP
• of the inner sheath of the cable	-	FRNC	FRNC
• of the cable sheath	PUR	PUR	FRNC
Ambient temperature			
• during operation	-40 ... +80 °C	-40 ... +70 °C	-25 ... +70 °C
• during transport	-40 ... +80 °C	-40 ... +70 °C	-40 ... +70 °C
• during storage	-40 ... +80 °C	-40 ... +70 °C	-40 ... +70 °C
• during installation	-20 ... +60 °C	-20 ... +60 °C	0 ... 50 °C
Bending radius			
• for one-off bending	32.5 mm	19.5 mm	39 mm
• for repeated bending	65 mm	49 mm	97.5 mm
Number of bending cycles	5,000,000 (torsional movement on 1 m cable ± 180°)	4000000	-
Tensile load, max.	130 N	150 N	150 N
Weight per length	54 kg/km	63 kg/km	68 kg/km
Fire behavior	Flame retardant to IEC 60332-1	Flame retardant to IEC 60332-1	Flame retardant to IEC 60332-3-22 Category A/F
Chemical resistance to mineral oil	resistant	resistant	conditional resistance
Radiological resistance to UV radiation	resistant	resistant	resistant
Product property			
• halogen-free	Yes	Yes	Yes
• Silicone-free	Yes	Yes	Yes
FastConnect electrical connection version	No	Yes	Yes
UL listing at 300 V rating	UL Style 21161	Yes / CMX	No
UL style at 600 V rating	No	No	Yes/CM/CMG/PLTC/Sun Res
Marine classification association	-	-	American Bureau of Shipping, Lloyds Register of Shipping, Det Norske Veritas, Germanischer Lloyd, Bureau Veritas

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 2 x 2

Technical specifications (continued)

Order No.	6XV1 871-2F	6XV1 871-2L	6XV1 871-2S
Product type description	IE FC TP FRNC Cable GP 2x2 (Type B)	IE FC TP Food Cable 2 x 2 (Type C)	IE FC Festoon Cable GP 2 x 2 (Type B)
Suitability for use	Occasional movement	Food and beverages industry	Daisy-chain cable use
Cable name	L-9YH(ST)CH x2x0.34/1.5-100 GN VZN FRNC	2YH(ST)C2Y 2X2X0.75/1.5-100 LI	2YY(ST)CY 2X2X0.75/1.5 LI GN
Standard for structured cabling	Cat5e	Cat5e	Cat5e
Electrical data			
Attenuation measurement per length			
• at 10 MHz	6.0 dB/100 m	6.9 dB/100 m	6.9 dB/100 m
• at 100 MHz	22.0 dB/100 m	23.5 dB/100 m	23.5 dB/100 m
Characteristic impedance at 1 MHz/100 MHz	100 Ω	100 Ω	100 Ω
• Relative symmetrical tolerance of characteristic impedance at 1 MHz ... 100 MHz	± 15%	± 5%	± 5%
Near-end crosstalk attenuation per length at 1 MHz ... 100 MHz	50 dB/100 m	50 dB/100 m	50 dB/100 m
Surface transfer impedance at 10 MHz	100 mOhm/m	10 mOhm/m	100 mOhm/m
Loop resistance per length	120 Ohm/km	120 Ohm/km	120 Ohm/km
Coefficient of insulation resistance	500 MOhm *km	500 MOhm *km	500 MOhm *km
Mechanical data			
Outer diameter			
• of the inner conductor	0.75 mm	0.75 mm	0.75 mm
• AWG cross-section	AWG 22	AWG 22	AWG 22
• of the wire insulation	1.5 mm	1.5 mm	1.5 mm
• of the inner sheath of the cable	3.9 mm	3.9 mm	3.9 mm
• of the cable sheath	6.5 mm	6.5 mm	6.5 mm
• Symmetrical tolerance of the outer diameter of the cable sheath	0.2 mm	0.2 mm	0.2 mm
Ambient temperature			
• during operation	-25 ... +70 °C	-40 ... +75 °C	-40 ... +75 °C
• during transport	-45 ... +75 °C	-50 ... +75 °C	-50 ... +75 °C
• during storage	-45 ... +75 °C	-50 ... +75 °C	-50 ... +75 °C
• during installation	0 ... 50 °C	-20 ... +60 °C	-20 ... +60 °C
Bending radius			
• for one-off bending	39 mm	20 mm	30 mm
• for repeated bending	90 mm	49 mm	70 mm
Number of bending cycles	-	-	5000000
Tensile load, max.	150 N	150 N	150 N
Weight per length	68 kg/km	55 kg/km	68 kg/km
Fire behavior	Flame retardant to IEC 60332-3-22 Category A/F	-	Flame retardant to IEC 60332-1
Chemical resistance to mineral oil	conditional resistance	-	conditional resistance
Radiological resistance to UV radiation	resistant	resistant	resistant
Product property			
• halogen-free	Yes	Yes	No
• Silicone-free	Yes	Yes	Yes
FastConnect electrical connection version	Yes	Yes	Yes
UL listing at 300 V rating	Yes/CMG/PLTC/Sun Res	-	Yes/CMG/PLTC/Sun Res
UL style at 600 V rating	No	-	Yes
Marine classification association	-	-	-

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 2 x 2

Ordering data	Order No.	Order No.	
IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; <u>Sold by the meter</u> max. length 1,000 m; minimum order 20 m <u>Preferred length</u> • 1000 m	6XV1 840-2AH10 6XV1 840-2AU10	IE FC TP Festoon Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use in festoon applications; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 871-2S
IE FC TP Flexible Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2B	IE TP torsion cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use with robots; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2F
IE FC TP FRNC Cable GP 2 x 2 (Type B) 4-core, shielded, halogen-free TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 871-2F	IE FC TP Food Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for the food and beverages industry; PROFINET-compatible; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 871-2L
IE FC TP Trailing Cable GP 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for use in trailing cables; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 870-2D	IE FC TP Marine Cable 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90; marine approval; max. length 1000 m, minimum order 20 m	6XV1 840-4AH10
IE FC TP Trailing Cable 2 x 2 (Type C) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug 180/90 for use in trailing cables; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m	6XV1 840-3AH10	IE Hybrid Cable 2x2 + 4x0.34 Flexible cable, 4 x Cu Cat5, shielded (0.75 mm) and 4 x Cu (0.34 mm ²) with IE FC modular outlet and power insert and IP67 hybrid plug connector; sold by the meter; up to 1000 m; minimum order 20 m	6XV1870-2J

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 2 x 2

Ordering data

Order No.

Accessories

IE FC stripping tool

Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables

6GK1 901-1GA00

IE FC Blade Cassettes (12 mm)

Replacement blade cassette for the Industrial Ethernet stripping tool; for use with IE FC Outlet RJ45, ELS TP40, 5 units

6GK1 901-1GB00

IE FC Blade Cassettes (5 mm)

Replacement blade cassette for the Industrial Ethernet stripping tool; for use with IE FC RJ45 Plugs and IE FC RJ45 Modular Outlet, 5 units

6GK1 901-1GB01

IE FC RJ45 plugs

RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables

IE FC RJ45 Plug 180

180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

IE FC RJ45 plug 90

90° cable outlet; e.g. for ET 200S

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB20-2AA0

6GK1 901-1BB20-2AB0

6GK1 901-1BB20-2AE0

IE FC RJ45 Plug 145

145° cable outlet; e.g. for SIMOTION and SINAMICS

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB30-0AA0

6GK1 901-1BB30-0AB0

6GK1 901-1BB30-0AE0

SIMATIC NET Manual Collection

Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English

6GK1 975-1AA00-3AA0

PROFINET Cabling and Interconnection Technology Guideline

See <http://www.profinet.com>

More information

Installation instructions

The bus cables are supplied by the meter with meter marks printed on them.

FastConnect

With the help of Industrial Ethernet FastConnect Stripping Tool, it is possible to strip the outer sheath and shield of Industrial Ethernet FastConnect cables 2 x 2 to the right length in one step. The IE Outlet RJ45 and the PROFINET-compatible plug-in connector IE FC RJ45 can be connected quickly and easily to the Industrial Ethernet FC cable 2 x 2.

Cable routing

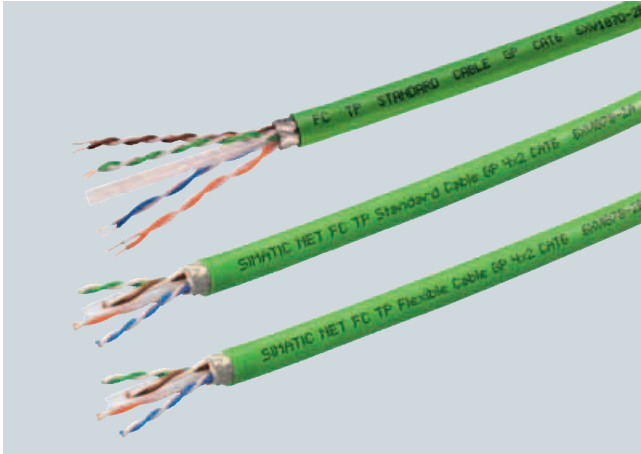
During storage, transport and cable laying, keep both ends sealed with a shrink-on cap; comply with the permissible bending radii and tensile load.

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 4 x 2

Overview



- 8-core FastConnect installation cables for cabling system with Gigabit capability (AWG 22 and AWG 24 versions)
- Easy stripping with the FastConnect Stripping Tool; the outer sheath and the braided shield are stripped accurately in one step
- Connection to IE FC RJ45 Modular Outlet (AWG 22) or IE FC RJ45 Plug 4 x 2 (AWG 24) using insulation-displacement technology
- Satisfies Category 6 (Cat6) of the international cabling standards ISO/IEC 11801 and EN 50173
- UL approval
- Easy length measurement thanks to printed meter markings

Benefits



- Time-saving due to quick and easy assembly using FastConnect cables 4 x 2 on IE FC RJ 45 Modular Outlet or IE FC RJ45 Plug 4 x 2
- Construction of an 8-core cabling system with Gigabit capability
- Thanks to the 8-core cabling it is now possible to implement two Industrial Ethernet connections for Fast Ethernet (with IE FC RJ45 Modular Outlet), as well as for Gigabit-Ethernet (with IE FC RJ45 Plug 4 x 2)
- Noise-immune network due to a consistent grounding concept.

Application

The 8-core cabling system of SIMATIC NET allows transmission rates of 10/100/1000 Mbit/s for Ethernet as with the service-independent cabling from the office environment. This permits the transition from the 4-core Industrial Ethernet cabling system to the 8-core cabling system with Gigabit capability.

The IE FC TP Standard Cable GP 4x2 (AWG 22) must be used in conjunction with the IE FC Modular Outlet and the TP Cords for constructing Industrial Ethernet networks (8-core) up to 100 m.

IE FC TP Standard Cable 4x2 (AWG 22)

The IE FC TP Standard Cable GP 4x2 (AWG 22) must be used in conjunction with the IE FC Modular Outlet and the TP Cords for constructing Industrial Ethernet networks (8-core) up to 100 m.

IE FC TP Cable 4x2 (AWG 24)

For direct connection without using patch technology, the IE FC RJ45 Plug 4 x 2 and the IE FC TP cable 4 x 2 (AWG 24) of up to 60 m can be used.

Note:

You will find other specifications of the network topology in the manual for TP and fiberoptic networks.

UL approvals

- The IE FC TP Cable GP 4 x 2 (AWG 22 and AWG 24) has the relevant UL approvals for laying in cable bundles and cable racks according to the specifications of NEC (National Electrical Code) Article 800/725.

Design

The FastConnect (FC) Industrial Ethernet cables IE FC Cable 4 x 2 (AWG 22 und AWG 24) are radially symmetrical in design and therefore allow the use of the IE FC stripping tool. The IE FC RJ45 Modular Outlet and the IE FC RJ45 Plug 4 x 2 can then be connected quickly and easily by means of insulation displacement contacts without the need for special tools.

Cable types

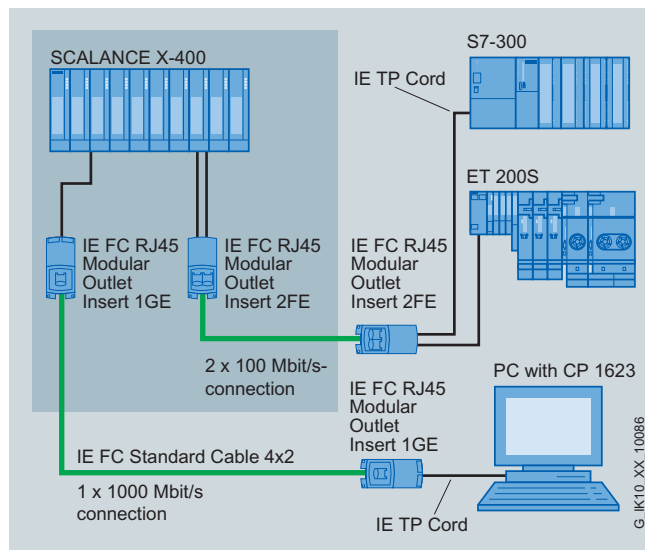
- **IE FC Standard Cable GP 4 x 2 (AWG 22):**
Standard bus cable with rigid cores specially designed for fast mounting on IE FC RJ45 Modular Outlet; with appropriate UL approval (General Purpose) for laying in cable bundles and on cable racks according to the specifications of the NEC (National Electrical Code) Article 800/725.
- **IE FC Standard Cable GP 4 x 2 (AWG 24):**
Standard bus cable with rigid cores specially designed for fast mounting on IE FC RJ45 Plug 4 x 2; with appropriate UL approval (General Purpose) for laying in cable bundles and on cable racks according to the specifications of the NEC (National Electrical Code) Article 800/725.
- **IE FC Flexible Cable GP 4 x 2 (AWG 24):**
Bus cable with flexible cores for occasional movement and specially designed for fast mounting on IE FC RJ45 Plug 4 x 2; with appropriate UL approval (General Purpose) for laying in cable bundles and on cable racks according to the specifications of the NEC (National Electrical Code) Article 800/725.

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 4 x 2

Integration



System configuration with IE FC RJ45 Modular Outlet 100 Mbit/s and 1000 Mbit/s

Technical specifications

Order No.	6XV1 870-2E
Product type description	IE FC TP Standard Cable GP 4 x 2 (AWG 22)
Suitability for use	for permanent installation, universally applicable
Cable name	SF/UTP 4x2xAWG22
Standard for structured cabling	Cat6
Electrical data	
Attenuation measurement per length	
• at 10 MHz	6.0 dB/100 m
• at 100 MHz	19.5 dB/100 m
• at 250 MHz	33.0 dB/100 m
Characteristic impedance at 1 MHz ... 250 MHz	100 Ω
• Relative symmetrical tolerance of characteristic impedance at 1 MHz ... 250 MHz	± 15%
Near-end crosstalk attenuation per length at 1 MHz ... 250 MHz	38.3 dB/100 m
Surface transfer impedance at 10 MHz	10 mOhm/m
Loop resistance per length	118 Ohm/km
Coefficient of insulation resistance	5000 MOhm*km
Mechanical data	
Outer diameter	
• of the core	1.25 mm
• of the inner sheath of the cable	7.6 mm
• of the cable sheath	9.6 mm
• symmetrical tolerance of the cable sheath	0.3 mm
Material	
• of the wire insulation	PE
• AWG cross-section	AWG 22
• of the inner sheath of the cable	PVC
• of the cable sheath	PVC
Ambient temperature	
• during operation	-40 ... +70 °C
• during transport	-40 ... +70 °C
• during storage	-40 ... +70 °C
• during installation	-20 ... +60 °C
Bending radius	
• for one-off bending	55 mm
• for repeated bending	80 mm
Number of bending cycles	-
Tensile load, max.	180 N
Weight per length	115 kg/km
Fire behavior	IEC 60332-1
Chemical resistance to mineral oil	conditional resistance
Radiological resistance to UV radiation	not resistant
Product property	
• halogen-free	No
• Silicone-free	Yes
FastConnect electrical connection version	Yes
UL listing at 300 V rating	Yes/CMG/Sun Res-
UL style at 600 V rating	-

PROFINET/Industrial Ethernet

Passive network components

IE FC TP Cable 4 x 2

Ordering data	Order No.	Order No.
IE FC TP Standard Cable GP 4 x 2 8-core, shielded TP installation cable for universal applications; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m <ul style="list-style-type: none"> • AWG 22, for connection to IE FC RJ45 Modular Outlet • AWG 24, for connection to IE FC RJ45 Plug 4 x 2 	6XV1 870-2E 6XV1 878-2A	IE FC RJ45 Modular Outlet Insert 2FE Replaceable insert for FC Modular Outlet Base; 2 x RJ45 for 2 x 100 Mbit/s interfaces; 1 pack = 4 items 6GK1 901-1BK00-0AA1 IE FC RJ45 Modular Outlet Insert 1GE Replaceable insert for FC Modular Outlet Base; 1 x RJ45 for 1 x 1000 Mbit/s interface; 1 pack = 4 items 6GK1 901-1BK00-0AA2
IE FC TP Flexible Cable GP 4 x 2 8-core, shielded TP installation cable for occasional movement; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m <ul style="list-style-type: none"> • AWG 24, for connection to IE FC RJ45 Plug 4 x 2 	6XV1 878-2B	IE FC RJ45 Plug 4 x 2 RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables 4 x 2; 180° cable outlet; for network components and CPs/CPU with Industrial Ethernet interface <ul style="list-style-type: none"> • 1 pack = 1 unit • 1 pack = 10 units • 1 pack = 50 units 6GK1 901-1BB11-2AA0 6GK1 901-1BB11-2AB0 6GK1 901-1BB11-2AE0
IE FC stripping tool Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables 4 x 2	6GK1 901-1GA00	
IE FC Blade Cassettes (5 mm) Replacement blade cassette for the Industrial Ethernet stripping tool, for use with IE FC RJ45 Plugs and IE FC RJ45 Modular Outlet, 5 units	6GK1 901-1GB01	IE Manual Collection Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English 6GK1 975-1AA00-3AA0
IE FC RJ45 Modular Outlet FastConnect RJ45 Outlet for Industrial Ethernet with interface for a replaceable insert; <ul style="list-style-type: none"> • without replaceable insert • With 2FE insert; ; replaceable insert for 2 x 100 Mbit/s interfaces • With 1GE insert; replaceable insert for 1 x 1000 Mbit/s interfaces • With power insert; replaceable insert for 1 x 24 V DC and 1 x 100 Mbit/s interface 	6GK1 901-1BE00-0AA0 6GK1 901-1BE00-0AA1 6GK1 901-1BE00-0AA2 6GK1 901-1BE00-0AA3	

More information

Installation instructions

The bus cable is supplied by the meter with meter marks printed on it.

FastConnect

With the help of Industrial Ethernet FastConnect Stripping Tool, it is possible to strip the outer sheath and shield of the Industrial Ethernet FastConnect cable 4 x 2 to the right length in one step. This allows the IE FC RJ45 Modular Outlet to be attached quickly and easily to the Industrial Ethernet FC cable 4 x 2.

Cable routing

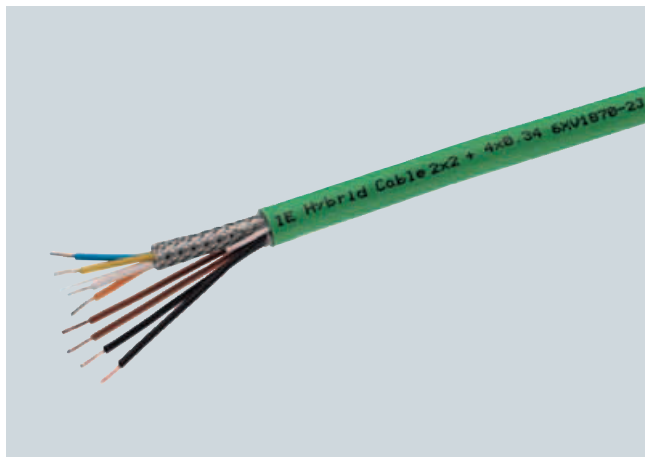
During storage, transport and cable laying, keep both ends sealed with a shrink-on cap; comply with the permissible bending radii and tensile load.

PROFINET/Industrial Ethernet

Passive network components

IE Hybrid Cable

Overview



- Industry-standard Industrial Ethernet hybrid cable for transmitting data (10/100 Mbit) and power (24 V/400 mA)
- The IE Hybrid cable 2x2 + 4x0.34 contains:
 - Industrial Ethernet cable 2 x 2 Cat5e, shielded as twisted quad (stranded, 4-core)
 - four power cores 0.34 mm² (stranded)

Benefits

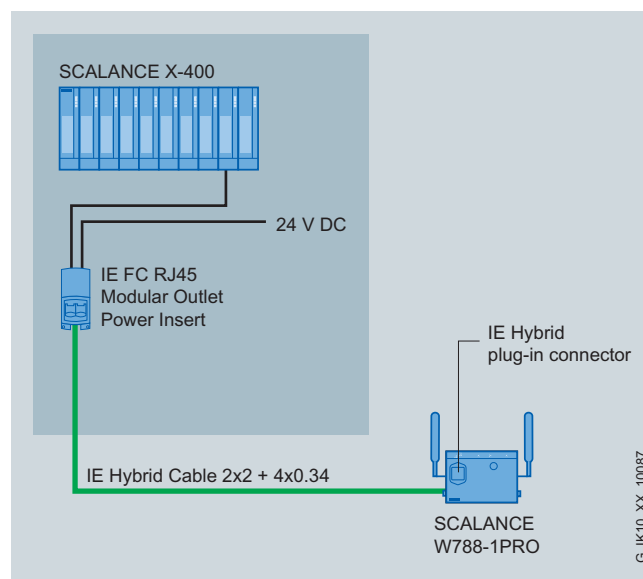


- Simple installation thanks to insulation displacement connections in IE FC RJ45 Modular Outlet and hybrid connectors at Access Point SCALANCE W
- Reduced installation cost since remote stations (e.g. SCALANCE W) are supplied via one single line.
- Halogen-free cables for universal use in the industrial and office areas
- Rugged, UV resistant industrial cable with UL approval

Application

The IE Hybrid cable 2x2 + 4x0.34 and the IE FC RJ45 Modular Outlet with Power Insert can be used to supply remote nodes (e.g. Access Points SCALANCE W) simultaneously with data (10/100 Mbit/s) and power. Having both data and power on one cable leads to a significant reduction of installation costs.

A maximum of 80 m can be covered between the IE FC RJ45 Modular Outlet and the Access Point SCALANCE W, with an additional 6 m patch cable on the Modular Outlet.



Network structure with IE FC RJ45 Modular Outlet and Power Insert for supplying the SCALANCE W-788 Access Points and the SCALANCE W-74xPRO client modules

Design

Rugged, halogen-free Ethernet hybrid cable with four shielded, flexible data cores (AWG22, twisted quad) and four power cores (0.34 mm²) for transmitting data and power.

The IE Hybrid cable 2x2 + 4x0.34 is available in customized lengths.

PROFINET/Industrial Ethernet

Passive network components

IE Hybrid Cable

2

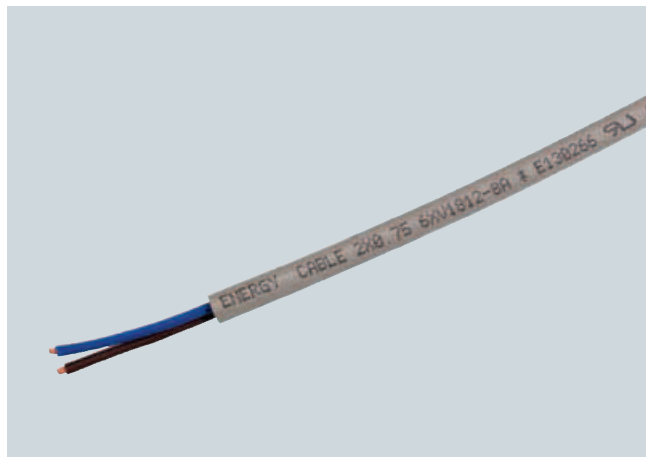
Technical specifications		Ordering data	Order No.
Order No.	6XV1 870-2J	IE Hybrid Cable 2x2 + 4x0,34	6XV1 870-2J
Product type description	IE Hybrid Cable 2x2 + 4x0.34	Flexible cable, 4 x Cu Cat 5E, shielded (AWG22) and 4 x Cu (0.34 mm ²) with IE FC RJ45 modular outlet and power insert and IP67 hybrid plug connector; sold by the meter	
Cable name	2YH (ST) C 2x2x0.75/1.5LI LIH H 2x2x0.34/1.6GN FRNC		
Quality class for network cables	Cat5e (data cores); AWG 22 (power cores)		
Electrical data		Additional components	
Attenuation per length at 10 MHz	7.5 dB/100 m	IE TP Cord RJ45/RJ45	
Attenuation per length at 100 MHz	26 dB/100 m	TP cable 4 x 2 with 2 RJ45 plugs	
Characteristic impedance at 1 MHz ... 100 MHz	100 Ω	• 0.5 m	6XV1 870-3QE50
• Relative symmetrical tolerance of characteristic impedance at 1 MHz ... 100 MHz	± 15%	• 1 m	6XV1 870-3QH10
Near-end crosstalk attenuation per length at 1 MHz ... 100 MHz	35.3 dB/100 m	• 2 m	6XV1 870-3QH20
Surface transfer impedance at 10 MHz	10 mOhm/m	• 6 m	6XV1 870-3QH60
Loop resistance per length	120 Ohm/km	• 10 m	6XV1 870-3QN10
Coefficient of insulation resistance	500 MOhm *km	IE TP XP Cord RJ45/RJ45	
Mechanical data		Twisted TP cable 4 x 2 with 2 RJ45 plugs	
Outer diameter		• 0.5 m	6XV1 870-3RE50
• of the wire insulation	0.76 mm	• 1 m	6XV1 870-3RH10
• of the AWG22 core	0.76 mm	• 2 m	6XV1 870-3RH20
• of the cable sheath	8.5 mm	• 6 m	6XV1 870-3RH60
Material		• 10 m	6XV1 870-3RN10
• of the cable sheath	FRNC	IE FC RJ45 Modular Outlet	
• of the inner sheath of the cable	FRNC	FastConnect RJ45 Outlet for Industrial Ethernet with interface for a replaceable insert;	
• of the wire insulation	PE	• With 2FE insert; replaceable insert for 2 x 100 Mbit/s interfaces	6GK1 901-1BE00-0AA1
Color		• With 1GE insert; replaceable insert for 1 x 1000 Mbit/s interfaces	6GK1 901-1BE00-0AA2
• of the wire insulation of the power wire	black/brown	• With power insert; replaceable insert for 1 x 24 V DC and 1 x 100 Mbit/s interface	6GK1 901-1BE00-0AA3
• of the cable sheath	green		
Ambient temperature		IP67 hybrid connector	09 45 125 1300.00
• during operation	-25 ... +70 °C	Connector for connecting SCALANCE W-700 to Industrial Ethernet and Power over Ethernet (PoE), with assembly instructions, 1 item	Order directly from: HARTING Deutschland GmbH & Co. KG PO Box 24-51 D -32381 Minden Tel. +49 571-8896-0 Fax. +49 571-8896-354 Email: de.sales@HARTING.com Internet: http://www.HARTING.com
• during storage	-25 ... +70 °C		
• during transport	-25 ... +70 °C		
• during installation	-25 ... +50 °C		
Bending radius		SIMATIC NET Manual Collection	6GK1 975-1AA00-3AA0
• for one-off bending	43 mm	Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English	
• for repeated bending	85 mm		
Tensile load, max.	260 N		
Weight per length	105 kg/km		
Chemical resistance to mineral oil	Conditionally resistant		
Product property			
• halogen-free	Yes		
• Silicone-free	Yes		
FastConnect electrical connection version	No		
Fire behavior	according to IEC 60332-3-24 Category C		
UL listing at 300 V rating	Yes		
UL style at 600 V rating	Yes: CMG, PLTC		

PROFINET/Industrial Ethernet

Passive network components

Power cables

Overview



- Different versions (5-core, 2-core) for different fields of application
- Rugged cable design for installation in industrial applications
- UL approvals
- Easy length measurement thanks to printed meter markings

Benefits



- Flexible application possibilities thanks to rugged cable design
- Silicon-free, therefore particularly suitable for use in the automotive industry (e.g. on paint shop conveyors)

Application

For the construction of PROFINET/PROFIBUS networks, different cable types are offered to suit the different types of application. The listed power cables should always be used. They are used for devices with degree of protection IP65/67 to connect the signaling contact or 24-V supply of the SCALANCE X and SCALANCE W components (power cable 2x0.75) and for the power supply (power cable 5x1.5 for ET 200).

UL approvals

As a result of appropriate UL styles, the cables can be used worldwide.

Design

Rugged 2-core or 5-core cable with circular cross-section for connection of signaling contact and power supply to IP65/67 components in industrial areas.

Cable types

The following cables with industrial capability are available for connection of the power supply and signaling contact:

- Power cable 2 x 0.75;
power cable for connection of signaling contact and 24 V supply voltage to SCALANCE X and SCALANCE W components
- Power cable 5 x 1.5;
power cable for connection of 24 V power supply of ET 200 using 7/8" plug connectors

PROFINET/Industrial Ethernet

Passive network components

Power cables

2

Technical specifications

Order No.	6XV1 812-8A	6XV1 830-8AH10
Product type description	Energy Cable	Energy Cable
Suitability for use	Connection of signaling contact and 24-V power supply to SCALANCE X and SCALANCE W	Power supply of ET 200 modules with 7/8" power port
Cable name	L-YY-2x1x0.75 GR	L-Y11Y-JZ 5x1x1.5 GR
Power wires		
Operating voltage (rms value)	600 V	600 V
Conductor cross-section of power wire	0.75 mm ²	1.5 mm ²
Continuous current of the power wires	6 A	16 A
General mechanical data		
Jacket		
• Outer diameter	7.4 mm	10.5 mm
• Symmetrical tolerance of the outer diameter	0.3 mm	0.3 mm
- Material	PVC	PUR
- Color	gray	gray
Ambient temperature		
• during operation	-20 ... +80 °C	-40 ... +80 °C
• during transport	-20 ... +80 °C	-40 ... +80 °C
• during storage	-20 ... +80 °C	-40 ... +80 °C
• during installation	-20 ... +80 °C	-40 ... +80 °C
Bending radius		
• for one-off bending	19 mm	26 mm
• for repeated bending	44 mm	63 mm
Number of bending cycles	-	-
Tensile load, max.	100 N	500 N
Weight per length	70 kg/km	149 kg/km
Fire behavior	Flame retardant to IEC 60332-1	Flame retardant to IEC 60332-1
Chemical resistance		
• to mineral oil	conditional resistance	resistant
• to grease	conditional resistance	resistant
Radiological resistance to UV radiation	resistant	resistant
Product property		
• halogen-free	No	No
• silicone-free	Yes	Yes
FastConnect electrical connection version	No	No
UL listing at 300 V rating	Yes/CL3	No
UL style at 600 V rating	Yes	Yes

PROFINET/Industrial Ethernet

Passive network components

Power cables

2

Ordering data

Order No.

Power cable 2 x 0.75

Power cable with trailing capability with 2 copper cores (0.75 mm²) for connecting to M12 plug-in connector; sold by the meter; max. 1000 m; minimum order quantity 20 m

6XV1 812-8A

Power cable 5 x 1.5

Power cable with trailing capability with 5 copper cores (1.5 mm²) for connecting to 7/8" plug-in connector; sold by the meter; max. 1000 m; minimum order quantity 20 m

6XV1 830-8AH10

Additional components

7/8" plug-in connector

Plug with axial cable outlet for field assembly for ET 200, 5-core, plastic enclosure, 1 pack = 5 items

- Male pins
- Socket insert

6GK1 905-0FA00

6GK1 905-0FB00

7/8" Power T-Tap PRO

Power T-piece for ET 200 with two 7/8" socket inserts and one 7/8" pin insert 1 pack = 5 items

6GK1 905-0FC00

Signaling Contact M12 Cable Connector PRO

Socket for connection of SCALANCE X208PRO for signaling contact; 5-pole, B-coded, with assembly instructions; 3 items

6GK1908-0DC10-6AA3

Power M12 Cable Connector PRO

Socket for connection of SCALANCE W-700 for 24 V DC supply voltage; 4-pole, A-coded, with assembly instructions, 3 items

6GK1 907-0DC10-6AA3

Power M12 Plug PRO

Plug for connection to PS791-1PRO power supply for 24 V DC supply voltage; 4-pole, A-coded, with assembly instructions, 3 items

6GK1 907-0DB10-6AA3

SIMATIC NET Manual Collection

Electronic manuals for communication systems, communication protocols, and communication products; on DVD, German/English

6GK1 975-1AA00-3AA0

More information

Cable routing:

During storage, transportation and cable laying, keep both ends sealed with a shrink-on cap.

Comply with the permissible bending radii and tensile load!

Note:

Additional components of the SIMATIC NET wiring range can be ordered from your local contact person.

For technical advice contact:

J. Hertlein, A&D SE PS

Tel.: +49(0)911/750 44 65

Fax.: +49(0)911/750 99 91

Email: juergen.hertlein@siemens.com

PROFINET/Industrial Ethernet

Passive network components

IE TP Cord

Overview



- Patch cable, available as preassembled cables (max. length 10 m)
- With 2 x 2 cores for 10/100 Mbit/s and 4 x 2 cores for 10/100/1000 Mbit/s Ethernet
- Small cable diameter
- Category Cat5e (2 x 2) and Cat6 (4 x 2) of the international cabling standards ISO/IEC 11801 and EN 50173

Benefits



- Easy connection of data terminals with an RJ45 connection to the Industrial Ethernet FC cabling system with interference immunity (10/100/1000 Mbit/s)
- Fast, error-free start-up thanks to preassembled, factory-tested patch cables
- Easy cable installation thanks to small cable diameter
- Silicon-free, therefore suitable for use in the automotive industry (e.g. on paint shop conveyors)
- Color-coded RJ45 plug to distinguish between twisted and untwisted cables
 - Twisted: RJ45 plug red on both sides
 - Not twisted: RJ45 plug green on both sides

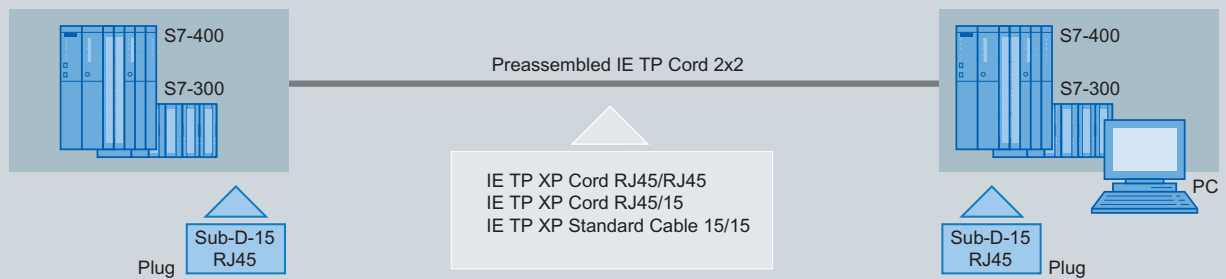
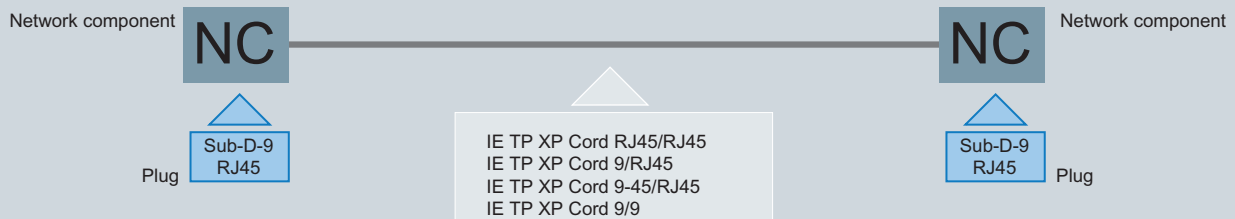
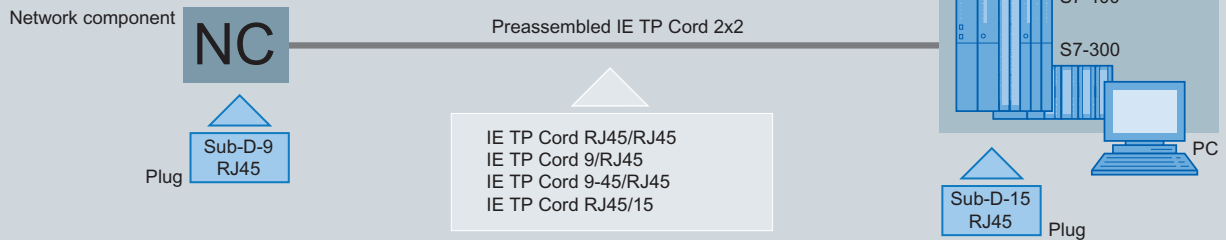
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PROFINET/Industrial Ethernet

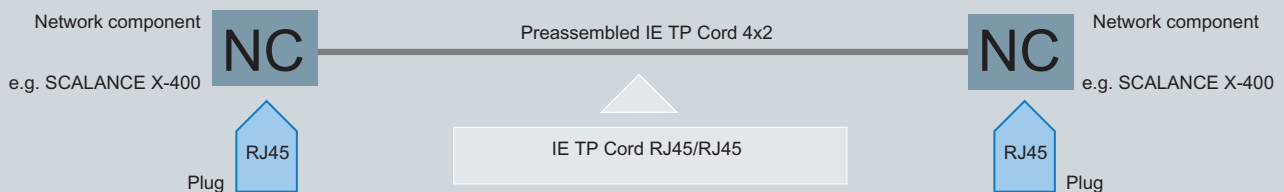
Passive network components

IE TP Cord

Application



IE TP Cord can be used to directly connect individual components (10/100 Mbit/s)



If components that do not support autocrossing are used,
an IE TP XP cord must be used between network components or terminals

IE TP Cord RJ45/RJ45 can be used to directly connect individual components (10/100/1000 Mbit/s)

G_IK10_XX_10092

PROFINET/Industrial Ethernet

Passive network components

IE TP Cord

Design

- 2 x 2 cores for 10/100 Mbit/s transmission rate;
4 x 2 cores for 10/100/1000 Mbit/s transmission rate
- Two cores with two dummy elements twisted into a pair.
- Each pair is encased in plastic film and shielded with a plastic-clad aluminum foil
- Outer woven shield around all pairs comprising tinned copper wires
- Plastic sheath (PVC)

IE TP Cord is available as TP Cord 4 x 2, pre-assembled cables in the following versions:

- *IE TP Cord RJ45/RJ45*
with 2 x RJ45 plugs
- *IE TP XP Cord RJ45/RJ45*
with 2 x RJ45 plugs, send and receive cables are twisted.

IE TP Cord is available as TP Cord 2 x 2, pre-assembled cables in the following versions:

- *IE TP Cord 9/RJ45*
with one 9-pole Sub-D connector and one RJ45 connector
- *IE TP XP Cord 9/RJ45*
with one RJ45 connector and one 9-pole Sub-D connector, send and receive cable are twisted
- *IE TP Cord 9-45/RJ45*
with one RJ45 connector and one 9-pole Sub-D connector, 45° cable outlet
- *IE TP XP Cord 9-45/RJ45*
with one RJ45 connector and one 9-pole Sub-D connector, 45° cable outlet; send and receive cable are twisted
- *IE TP XP Cord 9/9*
with two 9-pole Sub-D connectors, send and receive cable are twisted.
- *IE TP Cord RJ45/15*
with one RJ45 connector and one 15-pole Sub-D connector; this is used to directly connect data terminals with ITP interfaces to network components with an RJ45 interface.
- *IE TP XP Cord RJ45/15*
with one RJ45 connector and one 15-pole Sub-D connector, twisted send and receive cable; used for direct connection of a data terminal with 15-pole Sub-D connector to a data terminal with RJ45 plug.
- *IE TP Converter Cord 15/RJ45*
with a 15-pole Sub-D socket with slide locking and an RJ45 plug. A retaining clip clamps it in place. IE TP Converter Cord 15/RJ45 2 x 2 is used to connect data terminals with an RJ45 interface to the ITP cabling system, e.g. over the ITP Standard 9/15 cable.

Function

The flexibility of the cable ensures easy installation, for example in a control cabinet, or to connect equipment in a control room. The maximum length of an IE TP Cord is 10 m.

Adapter cables are used to connect devices with an ITP interface to devices with an RJ45 interface.

IE TP Converter Cord 15/RJ45 is used to convert an ITP interface of a data terminal to the RJ45 interface.

More information

Additional components of the SIMATIC NET wiring range can be ordered from your local contact person.

For technical advice contact:

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PROFINET/Industrial Ethernet

Passive network components

IE TP Cord

Technical specifications

Order No.	6XV1 850-2JE50	6XV1 870-3QE50
Product type description	IE TP Cord 2 x 2	IE TP Cord RJ45/RJ45 4 x 2
Cable name	LI 02YSCY 2x2x0.15/0.98 PIMF ICCS GN	LI02YSCH 4x2x0.15 PIMF GN FRNC
Electrical data		
Attenuation measurement per length		
• at 10 MHz max.	9.0 dB/100 m	8.6 dB/100 m
• at 100 MHz max.	28.5 dB/100 m	28.0 dB/100 m
• at 300 MHz max.	49.5 dB/100 m	50.1 dB/100 m
• at 600 MHz max.	75.0 dB/100 m	73.5 dB/100 m
Characteristic impedance at 1 MHz ... 100 MHz	100 Ω	100 Ω
• Relative symmetrical tolerance of characteristic impedance at 1 MHz ... 100 MHz	± 15%	± 15%
• Characteristic impedance at 10 MHz ... 600 MHz	100 Ω	100 Ω
• Relative symmetrical tolerance of characteristic impedance at 10 MHz ... 600 MHz	± 6%	± 10%
Near-end crosstalk attenuation		
• at 10 MHz	80 dB	80 dB
• at 100 MHz	72.5 dB	72.4 dB
• at 300 MHz	65 dB	65.3 dB
• at 600 MHz	61 dB	60.8 dB
Surface transfer impedance at 10 MHz	10 mOhm/m	10 mOhm/m
Mechanical data		
Wire diameter of the AWG26 wire	0.98 mm	1 mm
Outer diameter		
• of the inner conductor	0.5 mm	0.5 mm
• of the wire insulation	-	-
• of the cable sheath	3.7 mm x 5.8 mm	6.2 mm
• Symmetrical tolerance of the outer diameter	-	-
Ambient temperature		
• during operation	-40 ... +70 °C	-25 ... +70 °C
• during transport	-40 ... +70 °C	-40 ... +70 °C
• during storage	-40 ... +70 °C	-40 ... +70 °C
• during installation	0 ... 50 °C	0 ... 50 °C
Bending radius		
• for one-off bending	20 mm	30 mm
• for repeated bending	30 mm	45 mm
Weight per length	33 kg/km	50 kg/km
Fire behavior	IEC 60332-1-2	IEC 60332-1
Chemical resistance to grease	conditional resistance	conditional resistance
Chemical resistance to mineral oil	conditionally resistant	conditionally resistant
Product property		
• halogen-free	No	Yes
• silicone-free	Yes	Yes

PROFINET/Industrial Ethernet

Passive network components

IE TP Cord

2

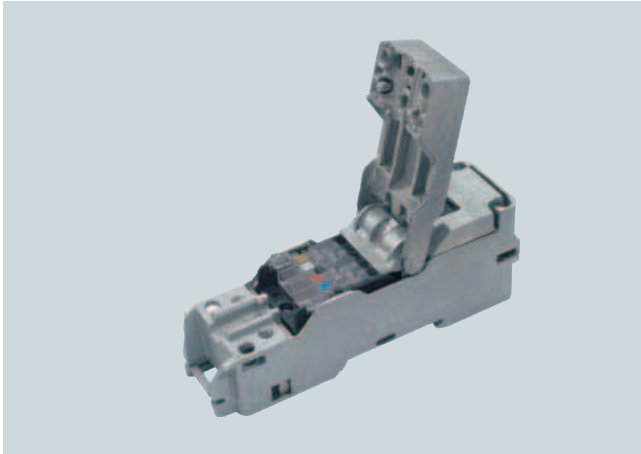
Ordering data	Order No.		Order No.	
IE TP Cord RJ45/RJ45 TP cable 4 x 2 with 2 RJ45 plugs <ul style="list-style-type: none">• 0.5 m• 1 m• 2 m• 6 m• 10 m	6XV1 870-3QE50 6XV1 870-3QH10 6XV1 870-3QH20 6XV1 870-3QH60 6XV1 870-3QN10		IE TP Cord RJ45/15 TP cable 2 x 2 with one 15-pole Sub-D connector and one RJ45 connector <ul style="list-style-type: none">• 0.5 m• 1 m• 2 m• 6 m• 10 m	6XV1 850-2LE50 6XV1 850-2LH10 6XV1 850-2LH20 6XV1 850-2LH60 6XV1 850-2LN10
IE TP XP Cord RJ45/RJ45 Twisted TP cable 4 x 2 with 2 RJ45 plugs <ul style="list-style-type: none">• 0.5 m• 1 m• 2 m• 6 m• 10 m	6XV1 870-3RE50 6XV1 870-3RH10 6XV1 870-3RH20 6XV1 870-3RH60 6XV1 870-3RN10		IE TP XP Cord RJ45/15 Crossed TP cable 2 x 2 with one 15-pole Sub-D connector and one RJ45 connector <ul style="list-style-type: none">• 0.5 m• 1 m• 2 m• 6 m• 10 m	6XV1 850-2SE50 6XV1 850-2SH10 6XV1 850-2SH20 6XV1 850-2SH60 6XV1 850-2SN10
IE TP Cord 9/RJ45 TP cable 2 x 2 with one 9-pole Sub-D connector and one RJ45 connector <ul style="list-style-type: none">• 0.5 m• 1 m• 2 m• 6 m• 10 m	6XV1 850-2JE50 6XV1 850-2JH10 6XV1 850-2JH20 6XV1 850-2JH60 6XV1 850-2JN10		IE TP Converter Cord 15/RJ45 TP connecting cable 2 x 2 for connecting data terminals with RJ45 interfaces to the ITP cabling system; with a 15-pole Sub-D socket with slide locking and an RJ45 connector. <ul style="list-style-type: none">• 0.5 m• 1 m	6XV1 850-2EE50 6XV1 850-2EH20
IE TP XP Cord 9/RJ45 Twisted TP cable 2 x 2 with one 9-pole Sub-D connector and one RJ45 connector <ul style="list-style-type: none">• 0.5 m• 1 m• 2 m• 6 m• 10 m	6XV1 850-2ME50 6XV1 850-2MH10 6XV1 850-2MH20 6XV1 850-2MH60 6XV1 850-2MN10		IE FC Outlet RJ45 For connection Industrial Ethernet FC cables and TP Cords; graded prices from 10 and 50 units	6GK1 901-1FC00 0AA0
IE TP Cord 9-45/RJ45 TP cable 2 x 2 with one RJ45 connector and one Sub-D connector with 45° cable outlet (not for OSM/ESM) <ul style="list-style-type: none">• 1 m	6XV1 850-2NH10		IE FC RJ45 Modular Outlet FastConnect RJ45 Outlet for Industrial Ethernet with interface for a replaceable insert; <ul style="list-style-type: none">• With 2FE insert ; replaceable insert for 2 x 100 Mbit/s interfaces• With 1GE insert; replaceable insert for 1 x 1000 Mbit/s interfaces• With power insert; replaceable insert for 1 x 24 V DC and 1 x 100 Mbit/s interface	6GK1 901-1BE00-0AA1 6GK1 901-1BE00-0AA2 6GK1 901-1BE00-0AA3
IE TP XP Cord 9-45/RJ45 Twisted TP cable 2 x 2 with one RJ45 connector and one Sub-D connector with 45° cable outlet (not for OSM/ESM) <ul style="list-style-type: none">• 1 m	6XV1 850-2PH10		SIMATIC NET Manual Collection Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English	6GK1 975-1AA00-3AA0
IE TP XP Cord 9/9 Twisted TP cable 2 x 2 for direct connection of two Industrial Ethernet components with an ITP interface with two 9-pole Sub-D connectors <ul style="list-style-type: none">• 1 m	6XV1 850-2RH10			

PROFINET/Industrial Ethernet

Passive network components

IE FC Outlet RJ45

Overview



- Easy installation of structured Twisted Pair cabling.
- Extremely fast installation thanks to insulation displacement.
- Rugged solid metal module certified to Category 5.
- Reliable shield contact and strain relief thanks to bolt-on cover
- Preventing mistakes with the help of color markings

Benefits



- Easy connection of network components or data terminals to the Industrial Ethernet FC cabling system with interference immunity.
- Time-saving, error-free installation thanks to FC cables and preassembled TP Cords (10/100 Mbit/s).
- Resistant to interference thanks to rugged metal casing and flexible mounting possibilities (standard rail mounting, screw fixing)
- Reliable shield contact and strain relief thanks to bolt-on cover
- Preventing mistakes with the help of color markings

PROFINET/Industrial Ethernet

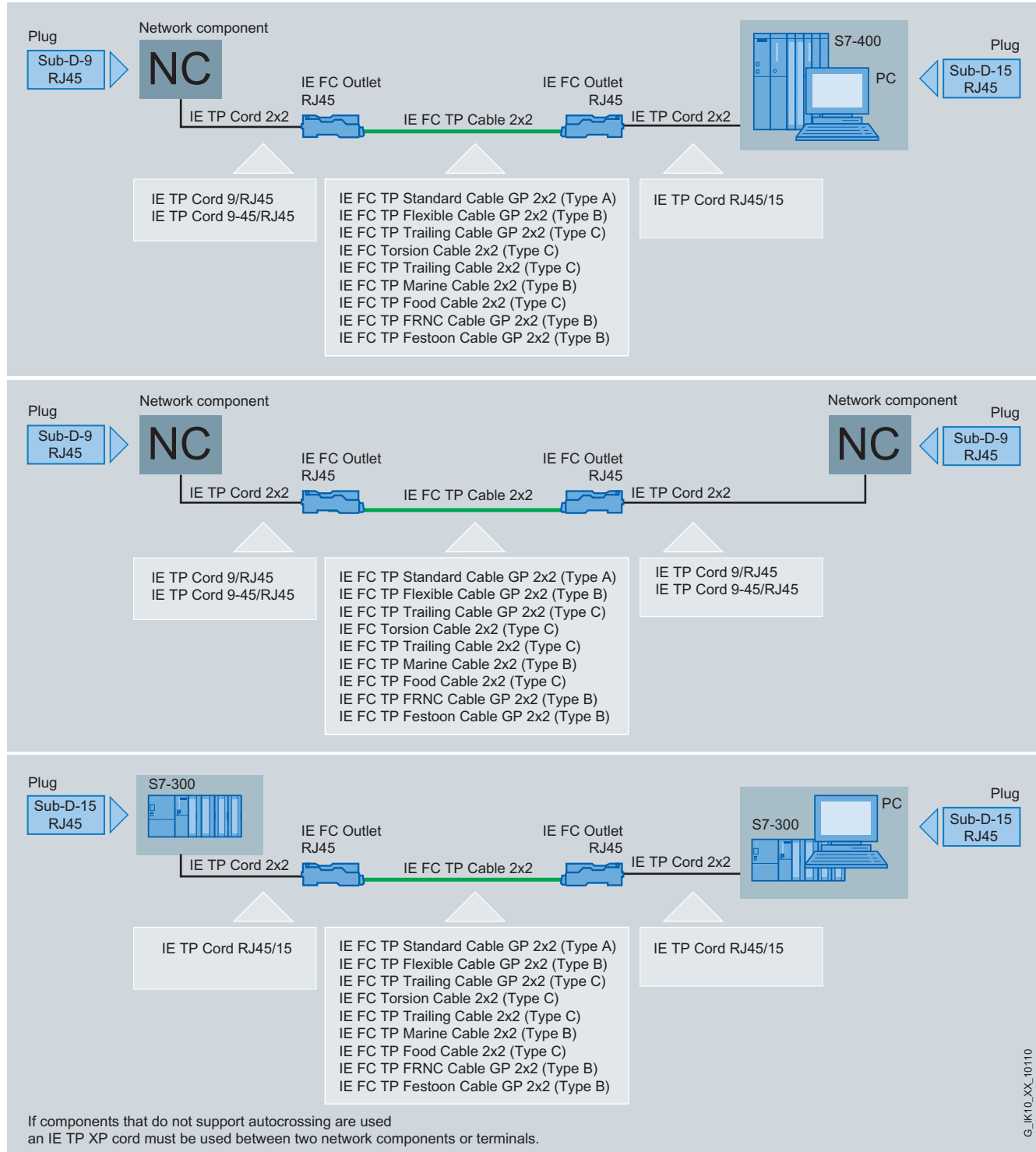
Passive network components

IE FC Outlet RJ45

Application

The IE FC Outlet RJ45 is used as a transition from the rugged Industrial Ethernet FC cables used in the industrial environment to prefabricated TP Cord cables (10/100 Mbit/s) using an RJ45 socket.

By connecting several IE FC Outlet RJ45 devices in series, a patch field can be constructed with the required connection density (e.g. 16 outlets over 19" width).



IE TP Cord can be used for patch technology with IE FC Outlet RJ45 (10/100 Mbit/s)

PROFINET/Industrial Ethernet

Passive network components

IE FC Outlet RJ45

Design

The IE FC Outlet RJ45 has a rugged metal housing and satisfies Category 5 of the international cable standard ISO/IEC 11801 and EN 50173. It is suitable both for mounting on rails and wall mounting by means of four through holes.

The Outlet RJ45 can also be mounted behind a metal plate with a cutout (e.g. in a control cabinet).

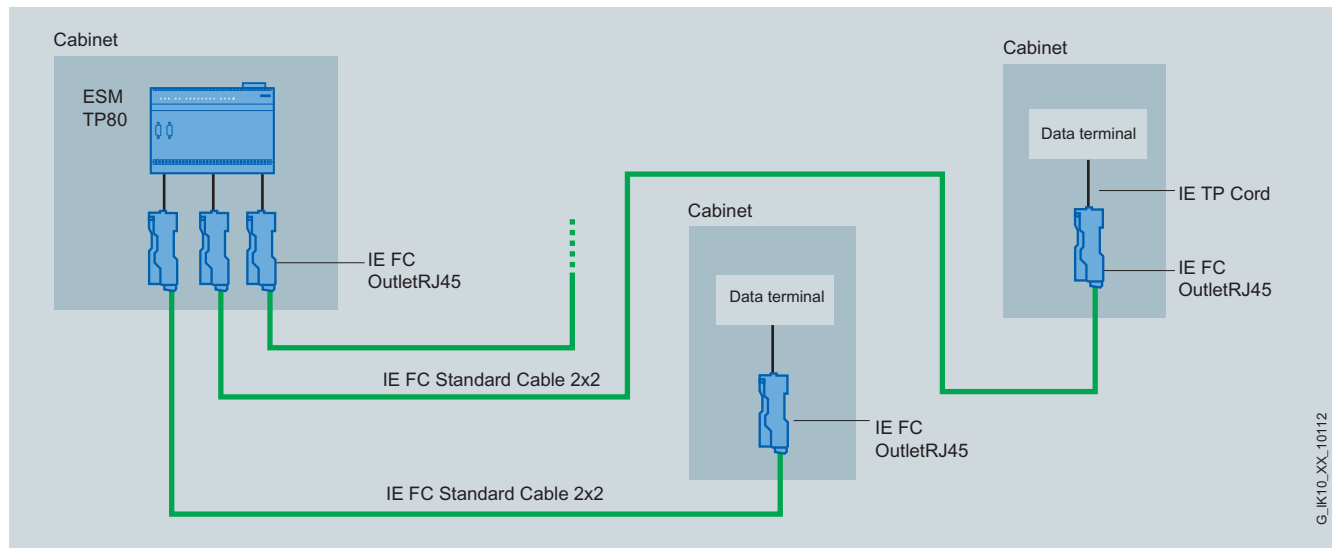
The Outlet RJ45 has the following connections

- 4 insulation-piercing contacts for connecting the Industrial Ethernet FC cable 2 x 2 (contacts are color coded)
- RJ45 socket with dust protection cap for connecting different TP Cord cables (10/100 Mbit/s).

Function

The Industrial Ethernet FC Outlet RJ45 is directly connected to the Industrial Ethernet FC cable 2 x 2.

Prefabricated RJ45 patch cables (10/100 Mbit/s) are available for the connection between the IE Outlet RJ45 and a network component or data terminal.



System configuration with IE FC Outlet RJ45

G_IK10_XX_10112

G_IK10_XX_10111

2/69

PROFINET/Industrial Ethernet

Passive network components

IE FC Outlet RJ45

Technical specifications

Order No.	6GK1 901-1FC00-0AA0
Product type description	IE FC RJ45 outlet
Design	CAT 5
Number of electrical connections for Industrial Ethernet FC TP cables 2x2	4
Electrical connection version	Insulation displacement terminals for all IE FC cables 2 x 2 RJ45 socket
<ul style="list-style-type: none"> for Industrial Ethernet FC TP cables for network components or terminal 	
Ambient temperature	
<ul style="list-style-type: none"> during operation during storage during transport 	-25 ... +70 °C -40 ... +70 °C -40 ... +70 °C
Width	31,7 mm
Height	107 mm
Depth	30 mm
Net weight	300 g
Type of fixing	Standard rail or wall mounting
Degree of protection	IP20
Certificate of suitability UL approval	Yes
Standard for structured cabling according to ISO/IEC 11801	Yes

Ordering data

IE FC Outlet RJ45 **6GK1 901-1FC00 0AA0**

For connection of Industrial Ethernet FC cables and TP Cords; graded prices from 10 and 50 units on

IE TP Cord 9/RJ45

TP cable 2 x 2 with one 9-pole Sub-D connector and one RJ45 connector

- 0.5 m
- 1 m
- 2 m
- 6 m
- 10 m

6XV1 850-2JE50
6XV1 850-2JH10
6XV1 850-2JH20
6XV1 850-2JH60
6XV1 850-2JN10

IE TP XP Cord 9/RJ45

Twisted TP cable 2 x 2 with one 9-pole Sub-D connector and one RJ45 connector

- 0.5 m
- 1 m
- 2 m
- 6 m
- 10 m

6XV1 850-2ME50
6XV1 850-2MH10
6XV1 850-2MH20
6XV1 850-2MH60
6XV1 850-2MN10

Ordering data (continued)

Order No.

IE TP Cord 9-45/RJ45

TP cable 2 x 2 with one RJ45 connector and one Sub-D connector with 45° cable outlet (not for OSM/ESM)

- 1 m

6XV1 850-2NH10

IE TP XP Cord 9-45/RJ45

Twisted TP cable with one RJ45 connector and one Sub-D connector with 45° cable outlet (not for OSM/ESM)

- 1 m

6XV1 850-2PH10

IE TP XP Cord 9/9

Twisted TP cable 2 x 2 for direct connection of two Industrial Ethernet components with an ITP interface with two 9-pole Sub-D connectors

- 1 m

6XV1 850-2RH10

IE TP Cord RJ45/15

TP cable 2 x 2 with one 15-pole Sub-D connector and one RJ45 connector

- 0.5 m
- 1 m
- 2 m
- 6 m
- 10 m

6XV1 850-2LE50
6XV1 850-2LH10
6XV1 850-2LH20
6XV1 850-2LH60
6XV1 850-2LN10

IE TP XP Cord RJ45/15

Twisted TP cable 2 x 2 with one 15-pole Sub-D connector and one RJ45 connector

- 0.5 m
- 1 m
- 2 m
- 6 m
- 10 m

6XV1 850-2SE50
6XV1 850-2SH10
6XV1 850-2SH20
6XV1 850-2SH60
6XV1 850-2SN10

IE TP Converter Cord 15/RJ45

TP connecting cable 2 x 2 for connecting data terminals with RJ45 interfaces to the ITP cabling system; with a 15-pole Sub-D socket with slide locking and an RJ45 connector.

- 0.5 m
- 1 m

6XV1 850-2EE50
6XV1 850-2EH20

SIMATIC NET Manual Collection

Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English

6GK1 975-1AA00-3AA0

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Modular Outlet

Overview



- Simple connection technology (insulation displacement contacts) for 8-core Industrial Ethernet FC twisted pair installation cables (Cat6)
- Safe connection technology thanks to visible connection area
- Industry-standard design
 - Rugged metal housing
 - Dust caps
- Wall and DIN rail mounting inside or outside control cubicles thanks to degree of protection IP40
- Good electromagnetic shielding and conduction due to metal housing
- Integral strain relief for 8-core installation cables
- Replaceable inserts for
 - 2 x Fast Ethernet connection
IE FC RJ45 modular outlet insert 2FE
 - 1 x Gigabit Ethernet connection
IE FC RJ45 Modular Outlet insert 1GE
 - 1 x Fast Ethernet connection, 1 x 24 V DC connection
IE FC RJ45 Modular Outlet Power Insert

Benefits



- Easy and problem-free assembly due to integrated color-coded insulation displacement contacts
- Time-saving and trouble-free installation with 8-core Industrial Ethernet FC TP installation cables
- Universal use due to replaceable inserts (insert for two 10/100 Mbit/s ports, one 1000 Mbit/s port or one 24 V DC power supply and 100 Mbit/s port)
- Wide operating temperature range (-20 °C to +70 °C)
- Reliable shield contact and strain relief thanks to bolt-on cover
- Protection of investment, as a 100 Mbit/s network can be upgraded without difficulty to a 1000 Mbit/s network by replacing the insert without having to release the cable contacts

Application

The 8-core cabling system of SIMATIC NET allows transfer rates of 10/100/1000 Mbit/s for Ethernet and for the service-independent cabling from this office environment. Thanks to the 8-core cabling it is now possible to implement 2 Industrial Ethernet connections for Fast Ethernet, but in future it will also be possible to upgrade to a Gigabit Ethernet connection. This implements the transition from 4-core Industrial Ethernet FastConnect TP cabling system to the 8-core Gigabit cabling system.

The FC RJ45 Modular Outlet base module can optionally be equipped with three different replaceable inserts, as follows:

- IE FC RJ45 Modular Outlet Insert 2FE with 2 x RJ45 sockets for 100 Mbit/s systems
- IE FC RJ45 Modular Outlet Insert 1GE with 1 x RJ45 socket for 1000 Mbit/s systems
- IE FC RJ45 Modular Outlet Power Insert for SCALANCE W IWLAN system with 1 x 24 V, 1 x RJ45 socket

Thus it is possible not only to implement individual device connections, but also 100 Mbit/s dual connections.

By replacing the insert, it is possible to switch from network structures that are operated at transfer rates of 100 Mbit/s to structures with rates of 1000 Mbit/s. Replacement of the cabling is not necessary (permanent cabling).

Like the 4-wire cabling system, the Gigabit cabling system with the IE FC RJ45 Modular Outlet also takes the conditions in the field of industrial automation into account. No special tools are required for the assembly; the same FC stripping tool is used as for the 4-wire system.

8-wire FC installations cables are used for the cabling (AWG 22):

- IE FC Standard Cable 4 x 2; for fixed routing as standard type for the IE FC RJ45 Modular Outlet Inserts 2FE and 1GE
- IE Hybrid Cable 2x2 + 4x0.34 for the IE FC RJ45 Modular Outlet with Power Insert

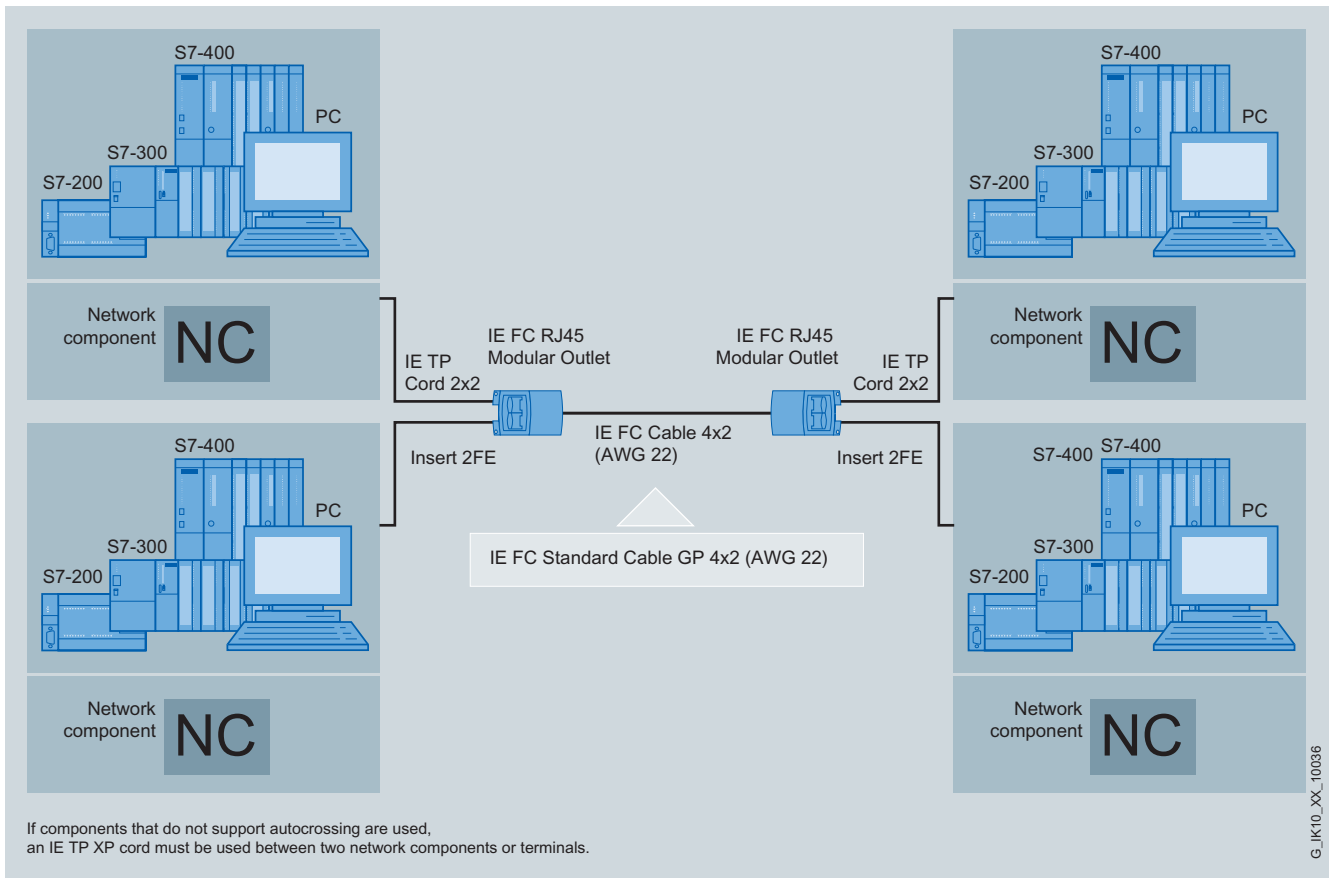
Max. distance which can be covered between two IE FC Modular Outlets using IE FC Standard Cable is 90 m; the total length of the patch cords to the terminal units at each end must not exceed 10 m.

PROFINET/Industrial Ethernet

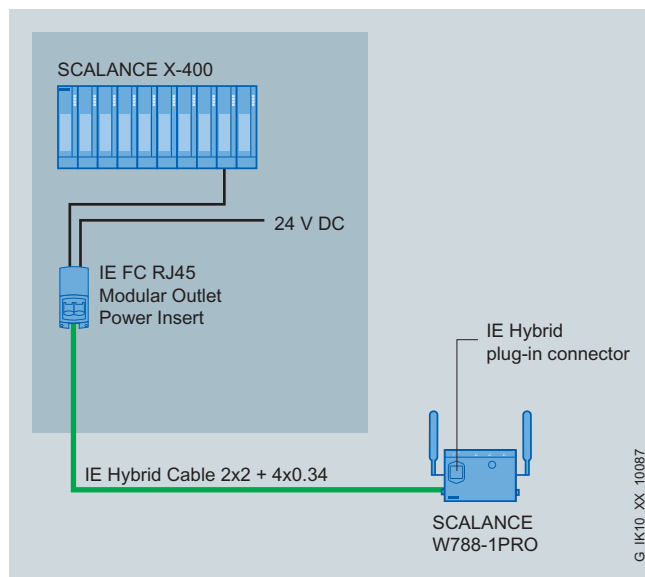
Passive network components

IE FC RJ45 Modular Outlet

Application examples



IE TP Cord can be used with IE FC RJ45 Modular Outlet with Insert 2FE (10/100 Mbit/s)



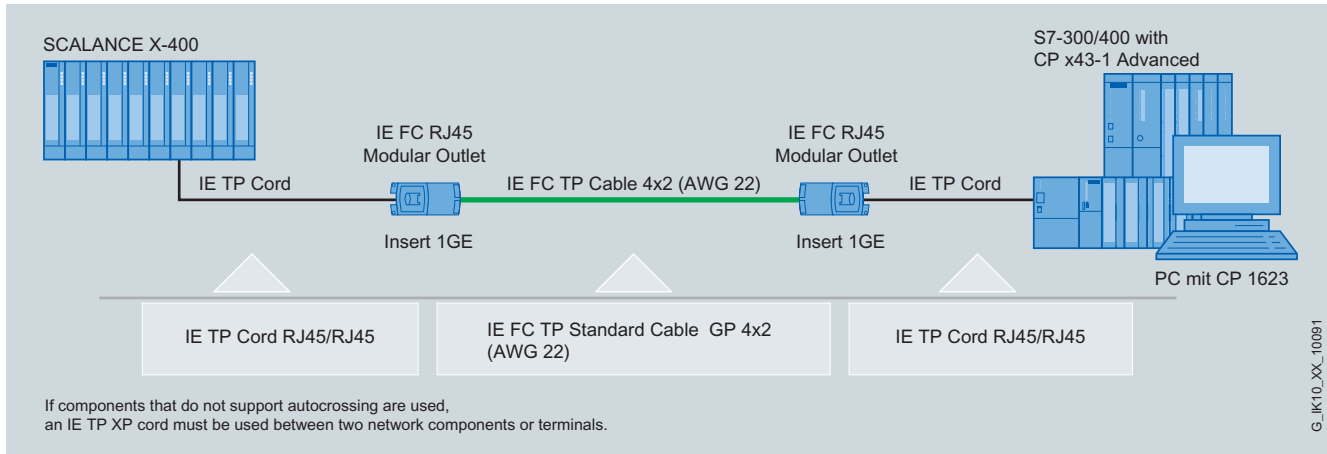
IE TP Cord can be used with IE FC RJ45 Modular Outlet with Power Insert (10/100 Mbit/s)

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Modular Outlet

Application examples (continued)



IE TP Cord RJ45/RJ45 can be used for patch technology with IE FC RJ45 Modular Outlet with Insert 1GE (10/100/1000 Mbit/s)

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Modular Outlet

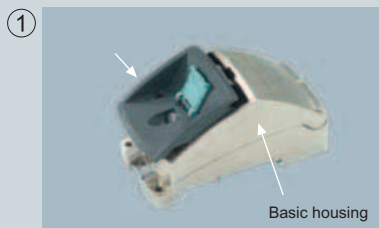
Design

IE FC RJ45 Modular Outlet (base modules)

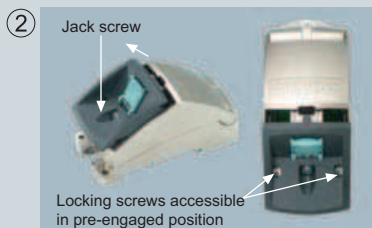
- Robust metal housing, complies with Category 6 of the international cabling standards ISO/IEC 11801 and EN 50173
- Suitable both for DIN rail and wall mounting
- Thanks to its high degree of protection IP40, it can be mounted directly on site

Ports:

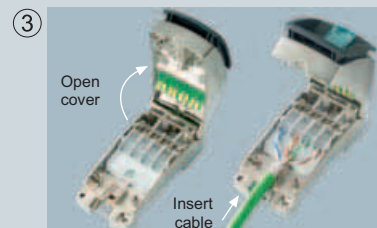
- 8 insulation displacement contacts for connection of the 8-core Industrial Ethernet FC installation cables
- Interface for insertion of a replaceable insert with one or two RJ45 sockets or one RJ45 socket and one terminal for 24 V DC voltage supply (outlet insert, outlet power insert).



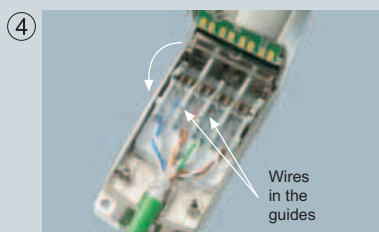
As delivered



Release insert with jack screw and pull into pre-engaged position



Connect cable



Connect cable:
Press down insulation displacement contacts



Close cover



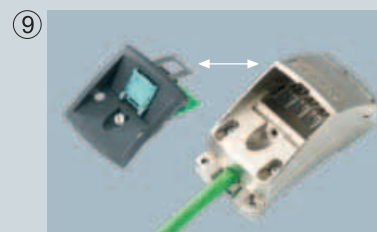
Push insert into end position. Tighten the interlocking screws of the strain-relief, push insert in, tighten jack screw



Outlet assembly complete



Outlet ready for use



Exchanging the insert: Insert can be replaced while basic housing is closed by pulling it past the pre-engaged position.

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Mounting instructions

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Modular Outlet

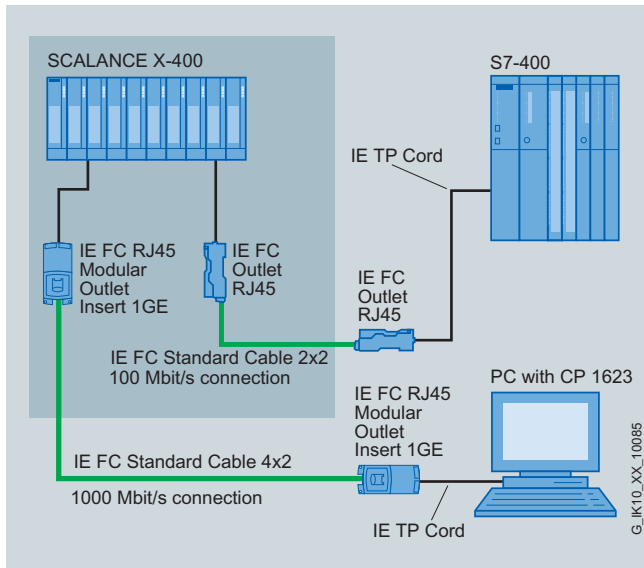
Function

The IE FC RJ45 Modular Outlet is connected direct to the 8-core Industrial Ethernet FC cables 4 x 2. Pre-assembled RJ45 patch cables (TP cord) are available for the connection between outlet and network component or data terminal. These conform with Cat6 of the international cabling standards.

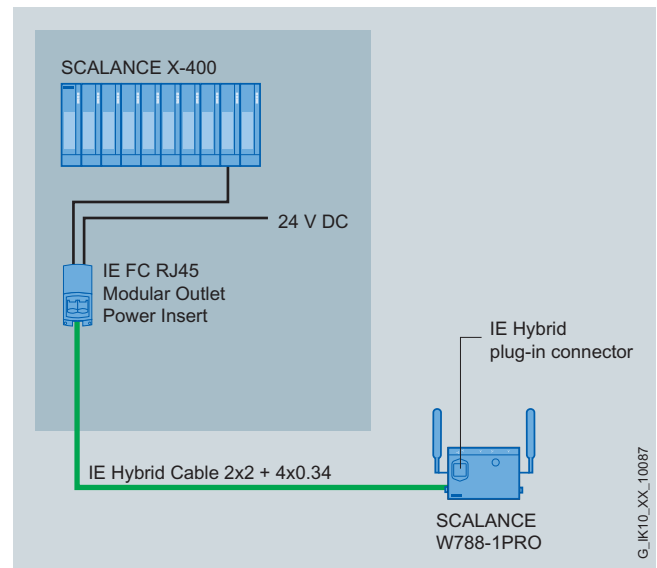
When housing is opened, colored markings on the contact element simplify connection of the individual wires to the insulation displacement contacts.

In order to supply remote stations with power and data, the IE FC RJ45 Modular Outlet with Power Insert is connected to the IE Hybrid Cable 2x2 + 4x0.34. A maximum of 80 m can be covered between the Outlet and the IP67 hybrid connector. The connection between Outlet and data terminal can be established using a patch cable with a maximum length of 6 m.

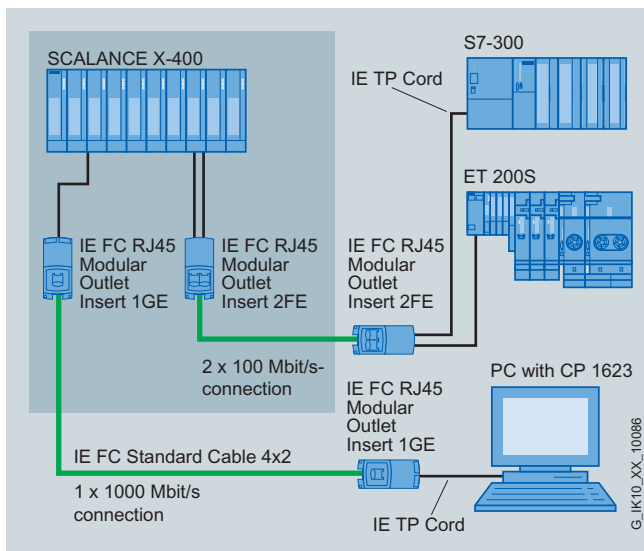
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System configuration with IE FC RJ45 Modular Outlet and FC Outlet RJ45



Network structure with IE FC RJ45 Modular Outlet with Power Insert



System configuration with IE FC RJ45 Modular Outlet 100 Mbit/s and 1000 Mbit/s

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Modular Outlet

Technical specifications

Order No.	6GK1 901-1BE00-0AA0	6GK1 901-1BE00-0AA1	6GK1 901-1BE00-0AA2	6GK1 901-1BE00-0AA3
Product type description	IE FC RJ45 Modular Outlet	IE FC RJ45 Modular Outlet (Insert 2FE)	IE FC RJ45 Modular Outlet (Insert 1GE)	IE FC RJ45 Modular Outlet (Power Insert)
Cable design	CAT 6	CAT 6	CAT 6	CAT 6
Number of electrical connections for Industrial Ethernet FC TP cables 4 x 2	8	8	8	8
Electrical connection version				
• for FC RJ45 Modular Outlet Insert 1GE	-	-	1 x RJ45 socket (10/100/1000 Mbit/s)	-
• for FC RJ45 Modular Outlet Insert 2FE	-	2 x RJ45 socket (10/100 Mbit/s)	-	-
• for FC RJ45 Modular Outlet Power Insert	-	-	-	1 x RJ45 socket (10/100 Mbit/s), 1 x 24 V DC terminal
• for Industrial Ethernet FC TP cables	integrated insulation displacement contacts	integrated insulation displacement contacts	integrated insulation displacement contacts	integrated insulation displacement contacts
Supply voltage				
Supply voltage for DC				
• Maximum	-	-	-	57 V
• Minimum	-	-	-	19 V
Ambient temperature				
• during operation	-20 ... +70 °C	-20 ... +70 °C	-20 ... +70 °C	-20 ... +70 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Max. relative humidity during operation	95%	95%	95%	95%
Width	50 mm	50 mm	50 mm	50 mm
Height	115.25 mm	115.25 mm	115.25 mm	115.25 mm
Depth	58.95 mm	58.95 mm	58.95 mm	58.95 mm
Net weight	450 g	450 g	450 g	450 g
Type of fixing	Standard rail or wall mounting	Standard rail or wall mounting	Standard rail or wall mounting	Standard rail or wall mounting
Degree of protection	IP40	IP40	IP40	IP40
Certificate of suitability UL approval	Yes	Yes	Yes	Yes
Standard for structured cabling according to ISO/IEC 11801	Yes	Yes	Yes	Yes

PROFINET/Industrial Ethernet

Passive network components

IE FC RJ45 Modular Outlet

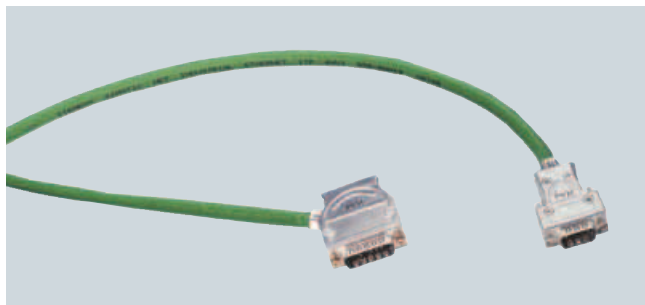
Ordering data	Order No.	Order No.
IE FC RJ45 Modular Outlet FastConnect RJ45 Outlet for Industrial Ethernet with interface for a replaceable insert; <ul style="list-style-type: none"> • without replaceable insert • with 2FE insert; replaceable insert for 2 x 100 Mbit/s interfaces • with 1GE insert; replaceable insert for 1 x 1000 Mbit/s interfaces • with power insert; replaceable insert for 1 x 24 V DC and 1 x 100 Mbit/s interface 	6GK1 901-1BE00-0AA0 6GK1 901-1BE00-0AA1 6GK1 901-1BE00-0AA2 6GK1 901-1BE00-0AA3	IE FC TP Standard Cable 4 x 2 8-core FastConnect cable (Cat6) for permanent wiring; sold by the meter IE Hybrid Cable 2x2 + 4x0.34 Flexible cable, 4 x Cu Cat5, shielded (0.75 mm) and 4 x Cu (0.34 mm ²) with IE FC modular outlet and power insert and IP67 hybrid plug connector; sold by the meter; up to 1000 m; minimum order 20 m Energy Cable 2-wire power cable; stranded wire, 2 x 0.75 mm ² , can be trailed, sold by the meter; up to 1000 m, minimum order 20 m IE TP Cord 8-core patch cable for connection between FC Modular Outlet base modules and data terminal; available in different lengths IE FC stripping tool Preadjusted stripping tool for fast stripping of Industrial Ethernet FC cables
IE FC RJ45 Modular Outlet Insert 2FE Replaceable insert for FC Modular Outlet Base; 2 x RJ45 for 2 x 100 Mbit/s interfaces; 1 pack = 4 items	6GK1 901-1BK00-0AA1	6XV1 870-2E
IE FC RJ45 Modular Outlet Insert 1GE Replaceable insert for FC Modular Outlet Base; 1 x RJ45 for 1 x 1000 Mbit/s interface; 1 pack = 4 items	6GK1 901-1BK00-0AA2	6XV1870-2J
		6XV1812-8A
		see TP Cord
		6GK1 901-1GA00

PROFINET/Industrial Ethernet

Passive network components

Industrial Twisted Pair – Cables/connectors

Overview



Industrial Twisted Pair cable

- For constructing Industrial Twisted Pair (ITP) networks
- Double cable shield for industrial use
- Easy to lay
- Low-cost connection of data terminals
- Exceeds Category 5 of the international cabling standards ISO/IEC 11801 and EN 50173
- Available as standard type and as halogen-free variant (FRNC)

Industrial Twisted Pair connector

- Connector is assembled on site with screw terminals without the need for special tools
- Data transfer is noise resistant thanks to
 - Rugged metal connector
 - System-wide grounding concept
- Fast, error-free installation using factory-tested preassembled cables.

Benefits



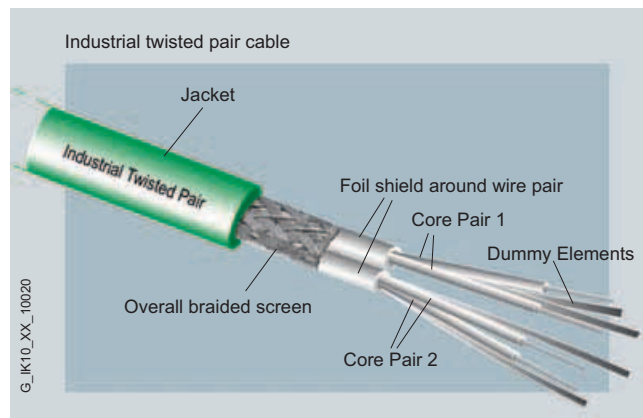
Data transfer is noise resistant thanks to

- double shielding with plastic and braided shield
- system-wide grounding concept
- silicon-free, therefore suitable for use in the automotive industry (e.g. on paint shop conveyors)
- available as standard and halogen-free variant

Function

- With their double, particularly dense shield, the industrial twisted pair cables are especially suitable for installation in industrial environments subject to electromagnetic interference, e.g. for linking control cabinets.
- An integrated grounding concept can be implemented through the outer shield.
- The ITP cable is flame retardant and has a copolymer outer casing FRNC (Flame Retardant Non Corrosive)
- The cables considerably exceed Category 5 of the international cabling standard. They can be implemented for up to 300 MHz and are suitable for Fast Ethernet with 100 Mbit/s.

Design



Industrial Twisted Pair cable

- 2 x 2 cores.
- Two cores with two dummy elements twisted into a pair.
- Each pair is encased in plastic film and shielded with two aluminum-clad plastic films
- Outer braided shield around all pairs made of tinned copper wire.
- Plastic sheath (PVC).

The ITP Cable is available as a pre-assembled cable in the following variants:

- *ITP Cable 9/15*
with a 9-pole and a 15-pole connector. It is used to directly connect data terminals with an ITP interface to Industrial Ethernet network components with an ITP interface.
- *ITP XP Standard Cable 9/9*
with two 9-pole connectors. It is twisted and used to directly connect two Industrial Ethernet network components with ITP interfaces.
- *ITP XP Standard Cable 15/15*
with two 15-pole connectors. It is twisted and used to directly connect two data terminals with ITP interfaces.

	Network components	Data terminal
Network components	ITP XP 9/9	ITP 9/15
Data terminal	ITP 9/15	ITP XP 15/15

Possible applications for pre-assembled ITP cables

Industrial Twisted Pair connector (9-pole)

- Metal Sub-D connector
- Vertical outgoing cable
- For connecting the 2 x 2-core installation cable to OSM or ESM
- Easy assembly using a screwdriver.

Industrial Twisted Pair connector (15-pole)

- Metal Sub-D connector
- Variable cable outlet
- For connecting the 2 x 2-core installation cable to a data terminal
- Internal plug-in jumper for automatic switchover from AUI to Twisted Pair operation in SIMATIC NET CPs with integrated Twisted Pair transceiver
- Easy assembly using a screwdriver.

PROFINET/Industrial Ethernet

Passive network components

Industrial Twisted Pair – Cables/connectors

2

Technical specifications

Order No.	6XV1 850-0AH10	6XV1 851-0AH10
Product type description	ITP Standard Cable GP for Industrial Ethernet	ITP FRNC Cable GP for Industrial Ethernet
Cable name	J-02YSCY 2 x 2 x 0.64/1.5 PIMF F GN	J-02YSCH 2 x 2 x 0.64/1.5 PIMF F GN FRNC
Electrical data		
Attenuation measurement per length		
• at 10 MHz	5.7 dB/100 m	5.7 dB/100 m
• at 100 MHz	18.0 dB/100 m	18.0 dB/100 m
• at 300 MHz	31.0 dB/100 m	31.0 dB/100 m
Characteristic impedance at 1 MHz ... 100 MHz	100 Ω	100 Ω
• Relative symmetrical tolerance	± 15%	± 15%
Characteristic impedance at 100 MHz ... 300 MHz	100 Ω	100 Ω
• Relative positive tolerance	+ 45%	+ 45%
Near-end crosstalk attenuation per length		
• at 1 MHz ... 100 MHz	80 dB/100 m	80 dB/100 m
• at 1 MHz ... 300 MHz	80 dB/100 m	80 dB/100 m
Surface transfer impedance at 10 MHz	0,02 mOhm/m	0,02 mOhm/m
DC impedance per length of the AWG22 wire	53 mOhm/m	53 mOhm/m
Max. operating voltage	160 V	160 V
Mechanical data		
Outer diameter of the inner conductor	0.64 mm	0.64 mm
Thickness of the cable sheath	6 mm	6 mm
• Symmetrical tolerance of the thickness	0.3 mm	0.3 mm
Width of the cable sheath	9.4 mm	9.4 mm
• Symmetrical tolerance of the width	-0.5 mm	-0.5 mm
Wire diameter of the AWG22 wire	0.64 mm	0.64 mm
Ambient temperature		
• during operation	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C
• during installation	-25 ... +80 °C	-25 ... +80 °C
Bending radius		
• for one-off bending	60 mm	60 mm
• for repeated bending	90 mm	90 mm
Tensile load, max.	80 N	80 N
Weight per length of copper	46 kg/km	46 kg/km
Type of screen	coated plastic sheet braid; braided: tinned Cu wires, 0.20 mm Ø, coverage approx. 90%	coated plastic sheet braid; braided: tinned Cu wires, 0.20 mm Ø, coverage approx. 90%
Weight per length	96 kg/km	98 kg/km
Fire behavior	IEC 60332-1	IEC 60332-3-24 Category C, IEC 60332-3-23 Category B
Chemical resistance		
• to mineral oil	conditional resistance	conditional resistance
• to grease	conditional resistance	conditional resistance
Product property		
• halogen-free	No	Yes
• Silicone-free	Yes	Yes
UL listing at 300 V rating	-	Yes/CMG/CL3/Sun Res

PROFINET/Industrial Ethernet

Passive network components

Industrial Twisted Pair – Cables/connectors

2

Ordering data	Order No.		Order No.
ITP Standard Cable for Industrial Ethernet Not pre-assembled, sold by the meter, 2 x 2-core, without plug For connecting a data terminal, for self-assembly of plug, or for connecting the patch field to the outlet	6XV1 850-0AH10	ITP XP Standard Cable 15/15 Twisted ITP installation cable for direct connection of two data terminals with an ITP interface; with two 15-pin Sub-D connectors <ul style="list-style-type: none"> • 2 m • 6 m • 10 m 	6XV1 850-0DH20 6XV1 850-0DH60 6XV1 850-0DN10
ITP Standard Cable 9/15 ITP installation cable for the direct connection of data terminals with an ITP interface to Industrial Ethernet network components with an ITP interface; with one 9-pin and one 15-pin Sub-D connector <ul style="list-style-type: none"> • 2 m • 5 m • 8 m • 12 m • 15 m • 20 m • 30 m • 40 m • 50 m • 60 m • 70 m • 80 m • 90 m • 100 m 	6XV1 850-0BH20 6XV1 850-0BH50 6XV1 850-0BH80 6XV1 850-0BN12 6XV1 850-0BN15 6XV1 850-0BN20 6XV1 850-0BN30 6XV1 850-0BN40 6XV1 850-0BN50 6XV1 850-0BN60 6XV1 850-0BN70 6XV1 850-0BN80 6XV1 850-0BN88 6XV1 850-0BT10	ITP FRNC Cable for Industrial Ethernet Not pre-assembled, halogen-free, sold by the meter, 2 x 2-core, without plug For connecting a data terminal, for self-assembly of plug, or for connecting the patch field to the outlet	6XV1 851-0AH10
		ITP FRNC Cable 9/15 ITP installation cable for the direct connection of data terminals with an ITP interface to Industrial Ethernet network components with an ITP interface; with one 9-pin and one 15-pin Sub-D connector <ul style="list-style-type: none"> • 2 m • 5 m • 8 m • 12 m • 15 m • 20 m • 30 m 	6XV1 851-1AH20 6XV1 851-1AH50 6XV1 851-1AH80 6XV1 851-1AN12 6XV1 851-1AN15 6XV1 851-1AN20 6XV1 851-1AN30
ITP XP Standard Cable 9/9 Twisted ITP installation cable for direct connection of two Industrial Ethernet network components with an ITP interface; with two 9-pin Sub-D connectors <ul style="list-style-type: none"> • 2 m • 5 m • 8 m • 12 m • 15 m • 20 m • 30 m • 40 m • 50 m • 60 m • 70 m • 80 m • 90 m • 100 m 	6XV1 850-0CH20 6XV1 850-0CH50 6XV1 850-0CH80 6XV1 850-0CN12 6XV1 850-0CN15 6XV1 850-0CN20 6XV1 850-0CN30 6XV1 850-0CN40 6XV1 850-0CN50 6XV1 850-0CN60 6XV1 850-0CN70 6XV1 850-0CN80 6XV1 850-0CN88 6XV1 850-0CT10	ITP plug ITP plug for Industrial Ethernet 9-pin For connection to OLM/ELM and OSM/ESM	6GK1 901-0CA00-0AA0
		ITP plug for Industrial Ethernet 15-pin For connection to a data terminal with an ITP interface	6GK1 901-0CA01-0AA0
		SIMATIC NET Manual Collection Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English	6GK1 975-1AA00-3AA0

More information

Installation instructions

The installation cable is either supplied by the meter or with preassembled connectors. It can be used to connect a single data terminal or two active network components (OSM/ESM).

On the network component side, 9-pole metal Sub-D connectors are used, and on the device side, 15-pole connectors are used. The 15-pole connectors contain a special plug-in jumper which can be used by modules with integrated twisted pair transceiver to switch from AUI to twisted pair operation.

Preassembled cables are used to connect data terminals directly to an active network component or for cascading active network components.

The ITP cables can also be ordered by the meter for on site assembly. 9-pole and 15-pole ITP connectors for assembly without special tools are available for this purpose.

The maximum cable length of a laid ITP Standard Cable is 100 m if connected directly.

ITP cables are intended only for use inside buildings.

Note:

Additional components of the SIMATIC NET wiring range can be ordered from your local contact person.

For technical advice contact:

J. Hertlein, A&D SE PS

Tel.: +49(0)911/750 44 65

Fax.: +49(0)911/750 99 91

Email: juergen.hertlein@siemens.com

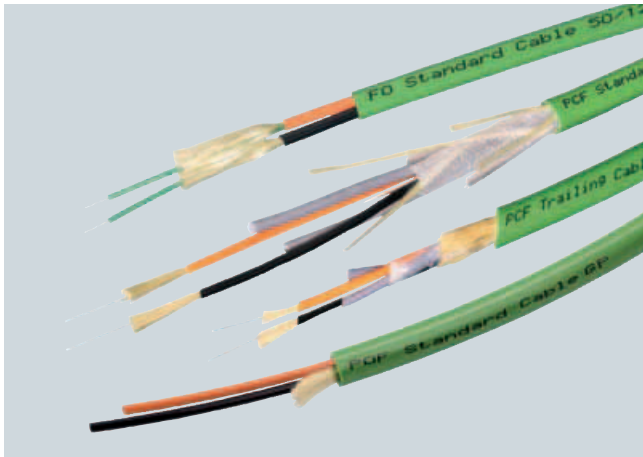
Additional installation instructions can be found in the manual for TP and fiber-optic-networks.

PROFINET/Industrial Ethernet

Passive network components

Overview of fiber-optic cables

Overview



- Optical signal transmission
- No radiation along the cable
- Unaffected by external noise fields
- No grounding problems
- Electrical isolation
- Low weight
- Easy routing

Application

The fiber optic (FO) cable is used for transmitting signals with the help of waves in the optical frequency range. The light beam is guided by means of total reflection at the transition from the core to the fiber material where there is a lower refractive index than at the core.

The fiber optic cable is provided with a protective coating.

Design

Fiber-optic cables with glass fibers, PCF fibers (**P**olymer **C**lad-ded **F**iber) and POF fibers (**P**olymer **O**ptical **F**iber) are offered for Industrial Ethernet:

- Glass fiber-optic cable;
duplex cable for fiber-optic networks indoors and outdoors
- POF fiber-optic cable;
Duplex cable for POF networks in the indoor area
- PCF fiber-optic cable;
duplex cable for PCF networks indoors and outdoors

Sheath material	Application
PVC	Standard use in indoor and outdoor areas of industrial applications
PUR	Highly mobile applications (trailing cables) for high mechanical or chemical stress in harsh industrial environments
PE	Routing of cables in moist areas indoors and outdoors, and for direct burying in earth
FRNC	Standard applications with high fire protection requirements

Approvals

UL listing (safety standard) for network cables is especially necessary for the American and Canadian markets. The requirements for the appropriate approvals depend on where the cable is routed within the building. This applies to all cables which have to be routed from a machine to a remote control cabinet and are positioned on cable racks secured on the building. OFN/OFNG cable for routing in bundles (general purpose cable)

PROFINET/Industrial Ethernet

Passive network components

Glass fiber optic cables

Overview



- Used for the optical Industrial Ethernet and PROFIBUS networks
- Rugged design for industrial applications indoors and outdoors
- Halogen-free design for installation inside buildings
- Trailing cable for the special application of forced motion control
- High immunity to noise thanks to insensitivity to electro-magnetic fields
- Available preassembled
- Extensive approvals (UL)

Benefits



- Easy routing with
 - Pre-assembled cables
 - No grounding problems
 - Very light fiber-optic cable
- Tap-proof due to lack of radiation from the cable
- Silicon-free; therefore suitable for use in the automotive industry (e.g. on paint shop conveyors)

Application

Fiber-optic indoor cable

Halogen-free fiber-optic cable, non-crush, flame-retardant, for installation inside buildings (e.g. in production halls and in building automation). Supplied in fixed lengths, pre-assembled with four BFOC connectors.

Standard FOC/FRNC cable

Fiber-optic cables for the following application areas indoors and outdoors

- For routing above ground
- For installation inside buildings.

Sold by the meter and in fixed lengths, pre-assembled with four BFOC connectors or four SC connectors.

Fiber-optic trailing cable

Fiber-optic cables for the special application of forced motion control, such as in continuously moving machine parts (in trailing cables) indoors and outdoors. Two cable variants are available for this application:

- FO Trailing Cable;
Cable for high mechanical stress, PUR outer sheath, no UL approval
- FO Trailing Cable GP (general purpose);
Cable for low mechanical stress, PVC outer sheath, with UL approval

Sold by the meter and in fixed lengths, pre-assembled with four BFOC connectors or four SC connectors.

Fiber-optic outdoor cable

Waterproof cable (lengthwise and sideways) for use outdoors with non-metallic protection against rodents for laying into the ground.

Sold by the meter and in fixed lengths, pre-assembled with four BFOC connectors or four SC connectors.

Note:

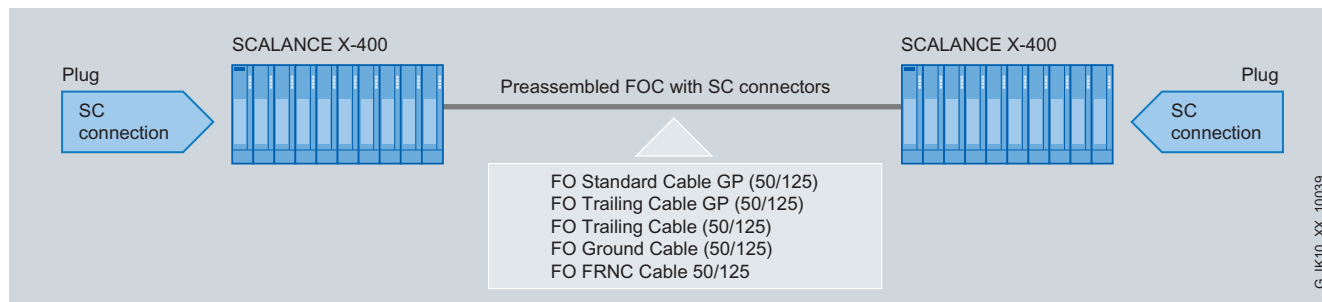
Special tools and specially trained personnel are required for pre-assembling glass fiber-optic cables

PROFINET/Industrial Ethernet

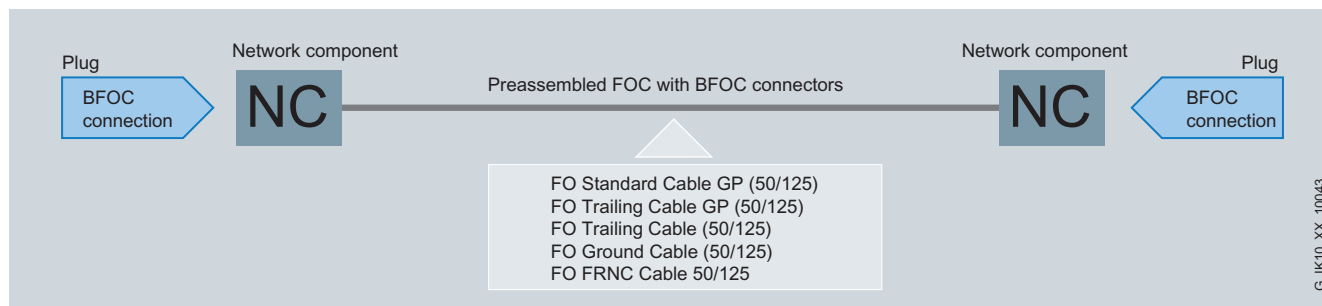
Passive network components

Glass fiber optic cables

Application examples

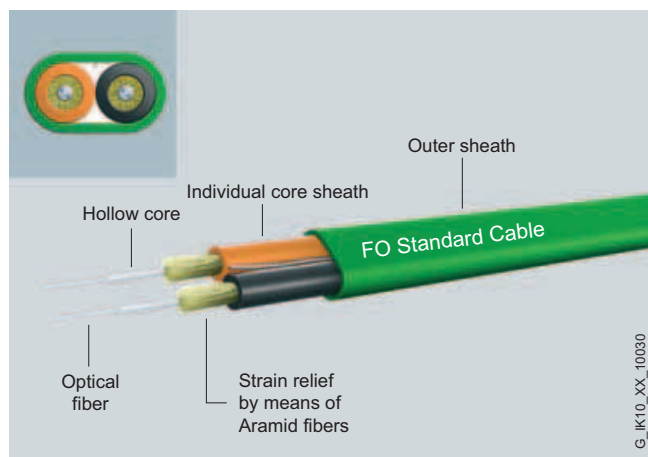


Use of pre-assembled fiber-optic cables with SC connectors (1000 Mbit/s)



Use of pre-assembled fiber-optic cables with BFOC connectors (100 Mbit/s)

Design



The following cable types are available in two variants, 50/125 μm and 62.5/125 μm :

- 100Base FX;
62.5/125 μm fiber, 3,000 m
- 100Base FX;
50/125 μm fiber, 3,000 m
- 1000Base SX;
50/125 μm fiber, 750 m
- 1000Base LX;
50/125 μm fiber, 2,000 m

In the respective applications, the maximum cable lengths must be taken into account. Passive connection of different fiber types is not permissible. The use of 50 μm fiber is recommended for future installations due to the greater range of gigabit Ethernet. Use of the 62.5 μm fiber is only recommended for existing network installations.

Cable types	50/125 μm	62,5/125 μm
FO Standard Cable GP	●	—
FO FRNC Cable	●	—
FO Trailing Cable	●	—
FO Trailing Cable GP	●	—
FO Ground Cable	●	—
FIBER OPTIC standard cable	—	●
INDOOR Fiber Optic indoor cable	—	●
Flexible Fiber Optic trailing cable	—	●

PROFINET/Industrial Ethernet

Passive network components

Glass fiber optic cables

2

Technical specifications

Order No.	6XV1 873-2A	6XV1 873-2B	6XV1 873-2G
Product type description	FO Standard Cable GP	FO FRNC Cable	FO Ground Cable
Suitability for use	Universal cable for installation indoors and outdoors	Halogen-free cable for installation indoors and outdoors	Waterproof cable (lengthwise and sideways) for use outdoors with non-metallic protection against rodents for laying into the ground.
Type of assembled fiber-optic cable	Sold by the meter; pre-assembled with 4 BFOC or SC connectors	Sold by the meter	Sold by the meter; pre-assembled with 4 BFOC or SC connectors
Designation of fiber-optic cable	AT-W(ZN)YY 2x1G50/125	AT-W(ZN)HH 2G50/125 UV	AT-WQ(ZN)Y(ZN)B2Y 2G50/125
Electrical data			
Attenuation measurement per length			
• at 850 nm	2.7 dB/km	2.7 dB/km	2.7 dB/km
• at 1300 nm	0.7 dB/km	0.7 dB/km	0.7 dB/km
Bandwidth length product			
• at 850 nm	600 Mhz*km	600 Mhz*km	600 Mhz*km
• at 1300 nm	1200 Mhz*km	1200 Mhz*km	1200 Mhz*km
Mechanical data			
Number of fibers per fiber-optic cable	2	2	2
Design of optical fibers	Multi-mode gradient fiber 50/125 µm	Multi-mode gradient fiber 50/125 µm	Multi-mode gradient fiber 50/125 µm
Design of optical fiber core	Hollow core, filled, diameter 1400 µm	Hollow core, filled, diameter 1400 µm	Hollow core, filled, diameter 1400 µm
Type of fiber-optic cable	Segmentable	Segmentable	Segmentable
Material			
• of the FOC core sheath	PVC	FRNC	PVC
• of the fiber-optic cable sheath	PVC	FRNC	PE
• of the strain relief	Aramid fibers	Aramid fibers	Aramid fibers
Color			
• of the FOC core sheath	orange/black	orange/black	orange/black
• of the fiber-optic cable sheath	green	green	black
Outer diameter			
• of the FOC core sheath	2.9 mm	2.9 mm	2.9 mm
• of the cable	-	9.2 mm	10.5 mm
Thickness of the cable	4.5 mm	-	-
Width of the cable	7.4 mm	-	-
Weight per length	40 kg/km	85 kg/km	90 kg/km
Tensile load, max.	500 N	1200 N	800 N
Lateral force per length	300 N/cm	500 N/cm	300 N/cm
Bending radius			
• for one-off bending	65 mm	90 mm	105 mm
• for repeated bending	-	135 mm	155 mm
Ambient temperature			
• during installation	-5 ... +50 °C	-5 ... +50 °C	-5 ... +50 °C
• during operation	-25 ... +80 °C	-40 ... +70 °C	-40 ... +75 °C
• during storage	-25 ... +80 °C	-40 ... +70 °C	-40 ... +75 °C
• during transport	-25 ... +80 °C	-40 ... +70 °C	-40 ... +75 °C
Transmission link			
• for 1000BaseLX	2000 m	2000 m	2000 m
• for 1000BaseSX	750 m	750 m	750 m

PROFINET/Industrial Ethernet

Passive network components

Glass fiber optic cables

Technical specifications (continued)

Order No.	6XV1 873-2A	6XV1 873-2B	6XV1 873-2G
Product type description	FO Standard Cable GP	FO FRNC Cable	FO Ground Cable
Fire behavior	Flame retardant acc. to IEC 60332-1	Flame retardant to IEC 60332-1 and IEC 60332-3 Category A/F	-
Chemical resistance			
• to mineral oil	conditional resistance	conditional resistance	resistant
• to grease	conditional resistance	conditional resistance	resistant
Radiological resistance to UV radiation	Yes	Yes	Yes
Product property			
• halogen-free	-	Yes	-
• impact-resistant	-	-	-
• Silicone-free	Yes	Yes	Yes
Certificate of suitability			
• UL Approval	Yes/OFN (NEC Article 770, UL 1651)	Yes/OFN (NEC Article 770, UL 1651)	-
• CSA approval	Yes/ OFN, 90°C, FT1, FT4 (CSA-Standard C22.2 No232-M1988)	Yes/ OFN, (CSA-Standard C22.2 No232)	-
Product component, rodent protection	-	-	Yes

Order No.	6XV1 873-2C	6XV1 873-2D
Product type description	FO Trailing Cable	FO Trailing Cable GP
Suitability for use	Cable for use in cable carriers for high mechanical loading, PUR outer sheath, no UL approval	Cable for use in cable carriers for low mechanical loading, PVC outer sheath, UL approval
Type of assembled fiber-optic cable	Sold by the meter; pre-assembled with 4BFOC or SC connectors	Sold by the meter; pre-assembled with 4BFOC or SC connectors
Designation of fiber-optic cable	AT-W(ZN)Y(ZN)11Y 2G50/125	AT-W(ZN)Y(ZN)Y 2G50/125
Electrical data		
Attenuation measurement per length		
• at 850 nm	2.7 dB/km	2.7 dB/km
• at 1300 nm	0.7 dB/km	0.7 dB/km
Bandwidth length product		
• at 850 nm	600 Mhz*km	600 Mhz*km
• at 1300 nm	1200 Mhz*km	1200 Mhz*km
Mechanical data		
Number of fibers per fiber-optic cable	2	2
Design of optical fibers	Multi-mode gradient fiber 50/125 µm	Multi-mode gradient fiber 50/125 µm
Design of optical fiber core	Hollow core, filled, diameter 1400 µm	Hollow core, filled, diameter 1400 µm
Type of fiber-optic cable	Segmentable	Segmentable
Material		
• of the FOC core sheath	PVC	PVC
• of the fiber-optic cable sheath	PUR	PVC
• of the strain relief	Aramid fibers	Aramid fibers
Color		
• of the FOC core sheath	orange/black	orange/black
• of the fiber-optic cable sheath	green	green
Outer diameter		
• of the FOC core sheath	2.9 mm	2.9 mm
• of the cable	10.5 mm	10.5 mm
Weight per length	90 kg/km	90 kg/km
Tensile load, max.	800 N	800 N
Lateral force per length	400 N/cm	400 N/cm

PROFINET/Industrial Ethernet

Passive network components

Glass fiber optic cables

2

Technical specifications (continued)

Order No.	6XV1 873-2C	6XV1 873-2D
Product type description	FO Trailing Cable	FO Trailing Cable GP
Bending radius		
• for one-off bending	200 mm	200 mm
• for repeated bending	200 mm	200 mm
Number of bending cycles	5000000	3500000
Impact strength test		
• Impact energy	-	-
• Number of impacts	-	-
• Hammer wheel diameter	-	-
Ambient temperature		
• during installation	-5 ... +50 °C	-5 ... +50 °C
• during operation	-40 ... +80 °C	-25 ... +80 °C
• during storage	-40 ... +80 °C	-25 ... +80 °C
• during transport	-40 ... +80 °C	-25 ... +80 °C
Transmission link		
• for 1000BaseLX	2000 m	2000 m
• for 1000BaseSX	750 m	750 m
Fire behavior	-	Flame retardant acc. to IEC 60332-1
Chemical resistance		
• to mineral oil	resistant	conditional resistance
• to grease	resistant	conditional resistance
Radiological resistance to UV radiation	Yes	Yes
Product property: silicone-free	Yes	Yes
Certificate of suitability		
• UL Approval	-	Yes/OFN(NEC Article 770, UL 1651)
• CSA approval	-	Yes/ OFN, 90°C, FT1, FT4 (CSA-Standard C22.2 No232-M1988)
Product component, rodent protection	-	-

Order No.	6XV1 820-7AH10	6XV1 820-5AH10
Product type description	INDOOR fiber optic indoor cable	Fiber optic standard cable
Suitability for use	Non-crush, halogen-free and fire-retardant cable for indoor installation	Universal cable for installation indoors and outdoors
Type of assembled fiber-optic cable	Sold by the meter, pre-assembled with 4 BFOC connectors	Sold by the meter, pre-assembled with 4 BFOC connectors
Designation of fiber-optic cable	T-VHH 2G62.5/125 3.2B200+0.9F600 F TB3 OR FRNC	AT-VYY 2G62.5/125 3.1B200 + 0.8F600 F
Electrical data		
Attenuation measurement per length		
• at 850 nm	3.1 dB/km	3.1 dB/km
• at 1300 nm	0.8 dB/km	0.8 dB/km
Bandwidth length product		
• at 850 nm	200 Mhz*km	200 Mhz*km
• at 1300 nm	600 Mhz*km	600 Mhz*km
Mechanical data		
Number of fibers per fiber-optic cable	2	2
Number of fibers per fiber-optic cable	-	-
Number of fibers per fiber-optic cable	-	-
Number of conductors in fiber-optic cable	-	-

PROFINET/Industrial Ethernet

Passive network components

Glass fiber optic cables

Technical specifications (continued)

Order No.	6XV1 820-7AH10	6XV1 820-5AH10
Product type description	INDOOR fiber optic indoor cable	Fiber optic standard cable
Design of optical fibers	Multi-mode gradient fiber 62.5/125 mm	Multi-mode gradient fiber 62.5/125 mm
Design of optical fiber core	Fixed core	Compact core
Type of fiber-optic cable	Segmentable inner conductor	Segmentable outer conductor
Material		
• of the FOC core sheath	Copolymer (FRNC)	PVC
• of the fiber-optic cable sheath	Copolymer (FRNC)	PVC
• of the strain relief	Aramid fibers	Kevlar fiber and impregnated glass fiber
Color		
• of the FOC core sheath	gray	gray
• of the fiber-optic cable sheath	light orange	black
Outer diameter	2.9 mm	3.5 mm
• Lower dimension	2.8 mm	3.3 mm
• Upper dimension	3 mm	3.7 mm
Width of the cable	6.8 mm	9.8 mm
• Thickness of the cable	3.9 mm	6.3 mm
Weight per length	30 kg/km	74 kg/km
Momentary lateral force per length	1 000 N/cm	2 000 N/cm
Continuous lateral force per length	200 N/cm	-
Maximum permissible short-time tensile load	800 N	-
Maximum permissible continuous tensile load	-	-
Bending radius when bending over the flat side		
• with cable laid	50 mm	145 mm
• during installation	60 mm	125 mm
Impact strength test		
• Impact energy	1,5 J	-
• Number of impacts	20	-
• Hammer wheel diameter	12.5 mm	-
Ambient temperature		
• during installation	-5 ... +50 °C	-5 ... +50 °C
• during operation	-20 ... +60 °C	-20 ... +60 °C
• during storage	-25 ... +70 °C	-25 ... +70 °C
• during transport	-25 ... +70 °C	-25 ... +70 °C
Fire behavior	Flame retardant to IEC 60332-3	Flame retardant to IEC 60332-3 (Cat. C)
Chemical resistance		
• to mineral oil	-	-
• to grease	-	-
Radiological resistance to UV radiation	-	Yes
Product property		
• halogen-free	Yes	-
• impact-resistant	Yes	-
• Silicone-free	Yes	Yes

PROFINET/Industrial Ethernet

Passive network components

Glass fiber optic cables

Technical specifications (continued)

Order No.	6XV1 820-6AH10
Product type description	Flexible Fiber Optic trailing cable
Suitability for use	Flexible cable for routing in cable carriers indoors and outdoors
Type of assembled fiber-optic cable	Sold by the meter, pre-assembled with 4 BFOC connectors
Designation of fiber-optic cable	AT-W11Y (ZN) 11Y 2G62.5/125 3.1B200 + 0.8F600 F
Electrical data	
Attenuation measurement per length	
• at 850 nm	3.1 dB/km
• at 1300 nm	0.8 dB/km
Bandwidth length product	
• at 850 nm	200 Mhz*km
• at 1300 nm	600 Mhz*km
Mechanical data	
Number of fibers per fiber-optic cable	2
Number of fibers per fiber-optic cable	1
Number of fibers per fiber-optic cable	2
Number of conductors in fiber-optic cable	2
Design of optical fibers	Multi-mode gradient fiber 62.5/125 mm
Design of optical fiber core	Hollow core, filled
Type of fiber-optic cable	Segmentable outer conductor
Material	
• of the FOC core sheath	PUR
• of the fiber-optic cable sheath	PUR
• of the strain relief	Aramid fibers, also GFK central element
Color	
• of the FOC core sheath	black
• of the fiber-optic cable sheath	black
Outer diameter of the FOC core sheath	3.5 mm
• Lower dimension	3.3 mm
• Upper dimension	3.7 mm
Outer diameter of the cable	12.9 mm
• Lower dimension	-
• Upper dimension	-
Weight per length	136 kg/km

Order No.	6XV1 820-6AH10
Product type description	Flexible Fiber Optic trailing cable
Momentary lateral force per length	-
Continuous lateral force per length	-
Maximum permissible short-time tensile load	2 000 N
Maximum permissible continuous tensile load	1 000 N
Bending radius (one-off), minimum permissible	150 mm
Bending radius for repeated bending, minimum permissible	150 mm
Bending radius for continuous bending	-
Number of bending cycles	100 000
Ambient temperature	
• during installation	-30 ... +60 °C
• during operation	-30 ... +60 °C
• during storage	-30 ... +70 °C
• during transport	-30 ... +70 °C
Transmission link for 1000BaseLX	-
Transmission link for 1000BaseSX	-
Fire behavior	-
Radiological resistance to UV radiation	Yes
Product property	
• halogen-free	Yes
• impact-resistant	No
• Silicone-free	Yes
Marine classification association	-

PROFINET/Industrial Ethernet

Passive network components

Glass fiber optic cables

2

Ordering data

Order No.

Order No.

FO Standard Cable GP 50/125 ²⁾

Sold by the meter;
max. length 1000 m;
minimum order 20 m;

Preferred lengths ¹⁾
pre-assembled
with 4 BFOC connectors

- 0.5 m
- 1 m
- 2 m
- 3 m
- 5 m
- 10 m
- 15 m
- 20 m
- 30 m
- 40 m
- 50 m
- 80 m
- 100 m
- 150 m
- 200 m
- 300 m

Preferred lengths ¹⁾
pre-assembled
with 4 SC connectors

- 0.5 m
- 1 m
- 2 m
- 3 m
- 5 m
- 10 m
- 15 m
- 20 m
- 30 m
- 40 m
- 50 m
- 80 m
- 100 m
- 150 m
- 200 m
- 300 m

FO FRNC Cable 50/125 ²⁾

Sold by the meter;
max. length 1000 m;
minimum order 20 m;

6XV1 873-2A

6XV1 873-3AH05

6XV1 873-3AH10

6XV1 873-3AH20

6XV1 873-3AH30

6XV1 873-3AH50

6XV1 873-3AN10

6XV1 873-3AN15

6XV1 873-3AN20

6XV1 873-3AN30

6XV1 873-3AN40

6XV1 873-3AN50

6XV1 873-3AN80

6XV1 873-3AT10

6XV1 873-3AT15

6XV1 873-3AT20

6XV1 873-3AT30

6XV1 873-6AH05

6XV1 873-6AH10

6XV1 873-6AH20

6XV1 873-6AH30

6XV1 873-6AH50

6XV1 873-6AN10

6XV1 873-6AN15

6XV1 873-6AN20

6XV1 873-6AN30

6XV1 873-6AN40

6XV1 873-6AN50

6XV1 873-6AN80

6XV1 873-6AT10

6XV1 873-6AT15

6XV1 873-6AT20

6XV1 873-6AT30

6XV1 873-2B

FO Trailing Cable 50/125 ²⁾

Sold by the meter;
max. length 1000 m;
minimum order 20 m;

Preferred lengths ¹⁾
pre-assembled
with 4 BFOC connectors

- 3 m
- 5 m
- 10 m
- 20 m
- 50 m
- 100 m

Preferred lengths ¹⁾
pre-assembled
with 4 SC connectors

- 3 m
- 5 m
- 10 m
- 20 m
- 50 m
- 100 m

FO Trailing Cable GP 50/125 ²⁾

Sold by the meter;
max. length 1000 m;
minimum order 20 m;

Preferred lengths ¹⁾
pre-assembled
with 4 BFOC connectors

- 3 m
- 5 m
- 10 m
- 20 m
- 50 m
- 100 m

Preferred lengths ¹⁾
pre-assembled
with 4 SC connectors

- 3 m
- 5 m
- 10 m
- 20 m
- 50 m
- 100 m

FO Ground Cable 50/125 ²⁾

Sold by the meter;
max. length 2000 m;
minimum order 20 m;

Preferred lengths ¹⁾
pre-assembled
with 4 BFOC connectors

- 100 m
- 200 m
- 300 m

Preferred lengths ¹⁾
pre-assembled
with 4 SC connectors

- 100 m
- 200 m
- 300 m

6XV1 873-2C

6XV1 873-3CH30

6XV1 873-3CH50

6XV1 873-3CN10

6XV1 873-3CN20

6XV1 873-3CN50

6XV1 873-3CT10

6XV1 873-6CH30

6XV1 873-6CH50

6XV1 873-6CN10

6XV1 873-6CN20

6XV1 873-6CN50

6XV1 873-6CT10

6XV1 873-2D

6XV1 873-3DH30

6XV1 873-3DH50

6XV1 873-3DN10

6XV1 873-3DN20

6XV1 873-3DN50

6XV1 873-3DT10

6XV1 873-6DH30

6XV1 873-6DH50

6XV1 873-6DN10

6XV1 873-6DN20

6XV1 873-6DN50

6XV1 873-6DT10

6XV1 873-2G

6XV1 873-3GT10

6XV1 873-3GT20

6XV1 873-3GT30

6XV1 873-6GT10

6XV1 873-6GT20

6XV1 873-6GT30

¹⁾ Special fiber-optic cables, lengths and accessories available on request

²⁾ Special tools and specially trained personnel are required for pre-assembling glass fiber-optic cables

PROFINET/Industrial Ethernet

Passive network components

Glass fiber optic cables

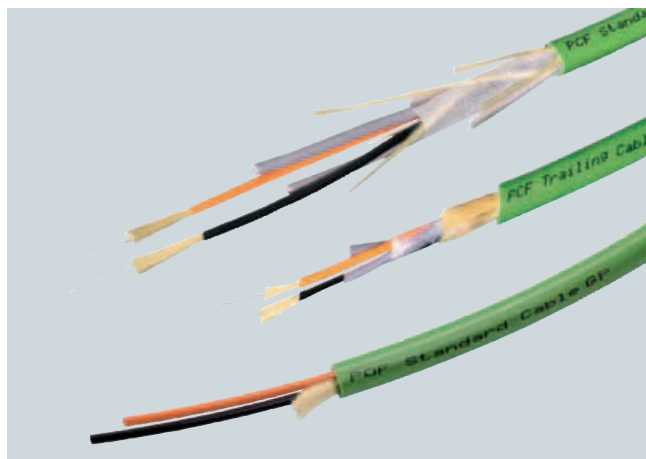
Ordering data	Order No.	Order No.
Standard FIBER OPTIC CABLE (62.5/125), segmentable ²⁾ Sold by the meter; max. length 2000 m; minimum order 20 m <u>Preferred lengths</u> ¹⁾ pre-assembled with 4 BFOC plugs <ul style="list-style-type: none"> • 1 m • 2 m • 3 m • 4 m • 5 m • 10 m • 15 m • 20 m • 30 m • 40 m • 50 m • 55 m • 60 m • 65 m • 70 m • 75 m • 80 m • 100 m • 120 m • 130 m • 150 m • 200 m • 250 m • 300 m 	6XV1 820-5AH10 6XV1 820-5BH10 6XV1 820-5BH20 6XV1 820-5BH30 6XV1 820-5BH40 6XV1 820-5BH50 6XV1 820-5BN10 6XV1 820-5BN15 6XV1 820-5BN20 6XV1 820-5BN30 6XV1 820-5BN40 6XV1 820-5BN50 6XV1 820-5BN55 6XV1 820-5BN60 6XV1 820-5BN65 6XV1 820-5BN70 6XV1 820-5BN75 6XV1 820-5BN80 6XV1 820-5BT10 6XV1 820-5BT12 6XV1 820-5BT13 6XV1 820-5BT15 6XV1 820-5BT20 6XV1 820-5BT25 6XV1 820-5BT30	Accessories BFOC connector set For standard, ground, trailing or indoor FIBER OPTIC CABLES, 20 units SIMATIC NET Manual Collection Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English ¹⁾ Special fiber-optic cables, lengths and accessories available on request ²⁾ Special tools and specially trained personnel are required for pre-assembling glass fiber-optic cables
INDOOR FIBER OPTIC CABLE (62.5/125), segmentable ²⁾ Sold by the meter; max. length 2000 m; minimum order 20 m <u>Preferred lengths:</u> pre-assembled with 4 BFOC connectors <ul style="list-style-type: none"> • 0.5 m • 1 m • 2 m • 3 m • 5 m • 10 m • 15 m • 20 m • 25 m • 50 m • 75 m • 100 m 	6XV1 820-7AH10 6XV1 820-7BH05 6XV1 820-7BH10 6XV1 820-7BH20 6XV1 820-7BH30 6XV1 820-7BH50 6XV1 820-7BN10 6XV1 820-7BN15 6XV1 820-7BN20 6XV1 820-7BN25 6XV1 820-7BN50 6XV1 820-7BN75 6XV1 820-7BT10	More information You can order components supplementary to the SIMATIC NET cabling range from your local contact. Technical advice on this subject is available from: J. Hertlein, A&D SE PS Tel.: +49(0)911/750 44 65 Fax: +49(0)911/750 99 91 E-mail: juergen.hertlein@siemens.com

PROFINET/Industrial Ethernet

Passive network components

POF and PCF fiber-optic cables

Overview



- Electrical isolation of PROFINET/Ethernet devices
- Protection of the transmission path against electromagnetic interference
- Up to 50 m cable length with plastic fiber optic cables and up to 100 m with PCF fiber optic cables
- Rugged fiber-optic standard cables, designed for industrial applications
- Extensive approvals (UL)

Benefits



- Plastic and PCF fiber optic cables can be pre-assembled on site
- Easy connector assembly on site
- Time savings on start-up thanks to pre-assembled cables
- Protection of the transmission path against electromagnetic interference
- Tap-proof, because the cable does not radiate

Application

SIMATIC NET POF and PCF fiber optic cables are used to construct optical indoor PROFINET and Industrial Ethernet networks. Devices with integral optical interface (SC RJ connection system) are, for example, SCALANCE X200-4P IRT, SCALANCE X201-3P IRT, SCALANCE X202-2P IRT, SCALANCE X101-1POF, ET 200S.

POF and PCF fiber optic cables can be assembled easily on site with SC RJ plugs. The maximum cable length between two devices is 50 m for POF and 100 m for PCF fiber-optic cables. PCF cables are also available preassembled with 2 SC RJ plugs.

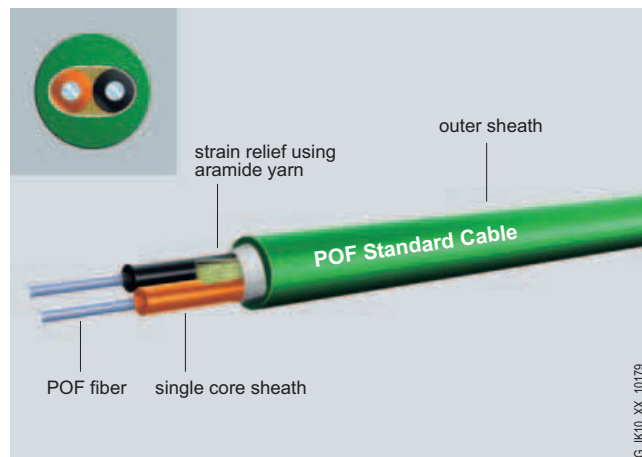
Design

Different types of POF and PCF fiber optic cables are offered:

POF fiber optic cables

Rugged round cables with green outer sheath and Kevlar strain relief elements as well as two plastic fibers with rugged Polyamid inner sheath for applications indoors/outdoors with cable lengths **up to 50 m**. The cables are suitable for assembly in the field.

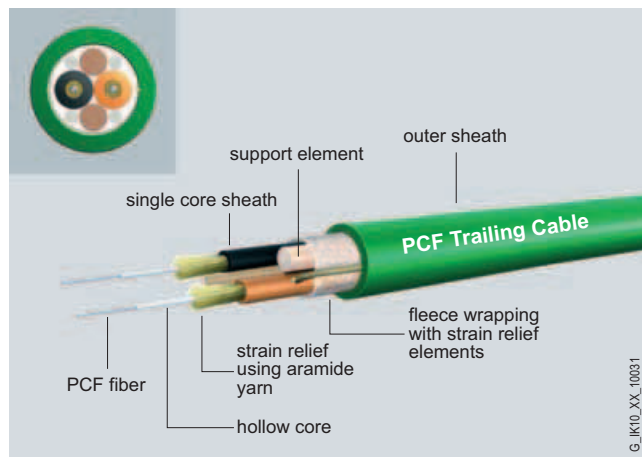
- *POF Standard Cable GP* (General Purpose); for applications indoor/outdoors
- *POF Trailing Cable*; for trailing cable applications



PCF fiber optic cables

Rugged round cables with green outer sheath and Kevlar strain relief elements for applications indoor/outdoors with cable lengths **up to 100 m**. The cables are suitable for assembly in the field.

- *PCF Standard Cable GP* (General Purpose); for applications indoor/outdoors with cable lengths up to 100 m.
- *PCF fiber-optic trailing cable*; for trailing cable applications with cable lengths of up to 100 m. The cable is suitable for assembly in the field. The following cable versions are available:
 - PCF Trailing Cable; cable for high mechanical stress, PUR outer sheath, no UL approval
 - PCF Trailing Cable GP (general purpose); cable for low mechanical stress, PVC outer sheath, with UL approval



PROFINET/Industrial Ethernet

Passive network components

POF and PCF fiber-optic cables

2

Technical specifications

Order No.	6XV1 874-2A	6XV1 874-2B
Product type description	POF Standard Cable GP 980/1000	POF Trailing Cable 980/1000
Suitability for use	For fixed routing indoors	For moving applications (e.g. trailing cables)
Type of assembled fiber-optic cable	Sold by the meter	Sold by the meter
Designation of fiber-optic cable	I-V4Y(ZN)Y 2P980/1000	I-V4Y(ZN)11Y 2P980/1000 FLEX UL
Electrical data		
Attenuation per length at 650 nm maximum	160 dB/km	180 dB/km
Bandwidth length product at 650 nm	10 MHz*100 m	10 MHz*100 m
Mechanical data		
Number of fibers per fiber-optic cable	2	2
Design of optical fibers	POF-FOC 980/1000 µm	POF-FOC 980/1000 µm
Material		
• of the FOC core sheath	PA	PA
• of the fiber-optic cable sheath	PVC	PUR
• of the strain relief	Kevlar fibers	Kevlar fibers
Color		
• of the FOC core sheath	orange/black	orange/black
• of the fiber-optic cable sheath	green	green
Outer diameter		
• of the fiber-optic cable core	980 µm	980 µm
• of the optical fiber sheath	1000 µm	1000 µm
• of the FOC core sheath	2.2 mm	2.2 mm
- Upper dimension	2.21 mm	2.21 mm
- Lower dimension	2.19 mm	2.19 mm
• of the cable	7.8 mm	8 mm
- Upper dimension	7.83 mm	-
- Lower dimension	7.77 mm	-
Weight per length	65 kg/km	55 kg/km
Tensile load, max.	100 N	100 N
Bending radius		
• for one-off bending	150 mm	60 mm
• for repeated bending	150 mm	60 mm
Number of bending cycles	-	5000000
Lateral force per length	100 N/cm	200 N/cm
Ambient temperature		
• during installation	0 ... 50 °C	5 ... 50 °C
• during operation	-30 ... +70 °C	-20 ... +70 °C
• during storage	-30 ... +70 °C	-40 ... +80 °C
• during transport	-30 ... +70 °C	-40 ... +80 °C
Chemical resistance		
• to ASTM oil 2	conditional resistance	resistant
• to mineral oil	conditional resistance	resistant
Radiological resistance to UV radiation	Yes	Yes
Product property		
• halogen-free	No	No
• Silicone-free	Yes	Yes
Fire behavior	Flame retardant acc. to IEC 60332-1	-
Certificate of suitability		
• UL Approval	Yes/OFN(NEC Article 770, UL 1651)	Yes/UL-758 AWM Style 5422
• CSA approval	Yes/OFN (CSA C22.2 No. 232)	No

PROFINET/Industrial Ethernet

Passive network components

POF and PCF fiber-optic cables

Technical specifications (continued)

PCF cables suitable for on-site assembly

Order No.	6XV1 861-2A	6XV1 861-2C	6XV1 861-2D
Product type description	PCF Standard Cable GP	PCF Trailing Cable	PCF Trailing Cable GP
Suitability for use	For permanent indoor and outdoor installation	For moving applications	For moving applications
Type of assembled fiber-optic cable	Sold by the meter	Sold by the meter	Sold by the meter
Designation of fiber-optic cable	ATI-V(ZN)YY 2K200/230	AT-V(ZN)Y(ZN)11Y 2K200/230	AT-V(ZN)Y(ZN)Y 2K200/230
Electrical data			
Attenuation per length at 660 nm maximum	10 dB/km	10 dB/km	10 dB/km
Bandwidth length product at 650 nm	17 MHz * km	17 MHz * km	17 MHz * km
Mechanical data			
Number of fibers per fiber-optic cable	2	2	2
Number of fibers per fiber-optic cable	1	1	1
Number of fibers per fiber-optic cable	2	2	2
Design of optical fibers	Step Index 200/230	Step Index 200/230	Step Index 200/230
Material			
• of the fiber-optic cable core	Fused silica	Fused silica	Fused silica
• of the optical fiber sheath	Special polymer	Special polymer	Special polymer
• of the fiber-optic cable sheath	PVC	PUR	PVC
• of the strain relief	Aramid fibers	Aramid fibers	Aramid fibers
• of the FOC core sheath	PVC	PVC	PVC
Color			
• of the fiber-optic cable sheath	green	green	green
• of the FOC core sheath	orange/black	orange/black	orange/black
Outer diameter			
• of the fiber-optic cable core	200 µm	200 µm	200 µm
• of the optical fiber sheath	230 µm	230 µm	230 µm
• of the FOC core sheath	2.2 mm	2.2 mm	2.2 mm
- Upper dimension	2.21 mm	2.21 mm	2.21 mm
- Lower dimension	2.19 mm	2.19 mm	2.19 mm
• of the cable	7.2 mm	8.8 mm	8.8 mm
- Upper dimension	7.7 mm	9.3 mm	9.3 mm
- Lower dimension	6.7 mm	8.3 mm	8.3 mm
Weight per length	45 kg/km	85 kg/km	85 kg/km
Tensile load, max.	100 N	800 N	800 N
Bending radius			
• for repeated bending, minimum permissible	105 mm	175 mm	175 mm
• for one-off bending, minimum permissible	105 mm	130 mm	130 mm
Number of bending cycles	-	5000000	5000000
Continuous lateral force per length	300 N/cm	300 N/cm	300 N/cm
Momentary lateral force per length	500 N/cm	500 N/cm	500 N/cm
Ambient temperature			
• during installation	-5 ... +50 °C	-5 ... +50 °C	-5 ... +50 °C
• during operation	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
• during storage	-25 ... +75 °C	-30 ... +75 °C	-30 ... +75 °C
• during transport	-25 ... +75 °C	-30 ... +75 °C	-30 ... +75 °C

PROFINET/Industrial Ethernet

Passive network components

POF and PCF fiber-optic cables

2

Technical specifications (continued)

Order No.	6XV1 861-2A	6XV1 861-2C	6XV1 861-2D
Product type description	PCF Standard Cable GP	PCF Trailing Cable	PCF Trailing Cable GP
Fire behavior	Flame retardant to IEC 60332-1	-	Flame retardant to IEC 60332-1
Chemical resistance			
• to ASTM oil 2	conditional resistance	resistant	conditional resistance
• to mineral oil	conditional resistance	resistant	conditional resistance
• to water	-	-	-
Radiological resistance to UV radiation	Yes	Yes	Yes
Product property			
• halogen-free	-	-	-
• Silicone-free	Yes	Yes	Yes
Certificate of suitability			
• UL Approval	Yes/OFN (NEC Article 770, UL 1651)	-	Yes/OFN (NEC Article 770, UL 1651)
• CSA approval	Yes/ OFN, 90°C, FT1, FT4 (CSA- Standard C22.2 No232-M1988)	-	Yes/ OFN, 90°C, FT1, FT4 (CSA- Standard C22.2 No232-M1988)

Ordering data

Order No.	Order No.	Order No.
POF Standard Cable GP 980/1000	6XV1 874-2A	Termination Kit SC RJ POF Plug
POF standard cable for fixed routing indoors, with PVC sheath; sold by the meter		Assembly case for local assembly of SC RJ connectors, comprising a stripping tool, Kevlar scissors, microscope, grinding paper and grinding base
POF Trailing Cable 980/1000	6XV1 874-2B	IE SC RJ POF Plug
POF trailing cable with rugged PUR sheath; sold by the meter		Screw connector for local assembly on POF FOC (1 pack = 20 items)
PCF Standard Cable GP 200/230	6XV1 861-2A	IE SC RJ POF refill set
Standard cable, segmentable, sold by the meter; max. quantity 2000 m; minimum order 20 m;		Refill set for Termination Kit SC RJ POF Plug consisting of grinding paper and grinding base (set of 5)
PCF Trailing Cable 200/230	6XV1 861-2C	Termination Kit SC RJ PCF Plug
Trailing cable, segmentable, sold by the meter; max. quantity 2000 m; minimum order 20 m;		Assembly case for local assembly of SC RJ connectors, comprising a stripping tool, buffer stripping tool, Kevlar scissors, fiber breaking tool, microscope
PCF Trailing Cable GP 200/230	6XV1 861-2D	Industrial Ethernet SC RJ PCF Plug
Trailing cable, segmentable, sold by the meter; max. length 2000 m; minimum order quantity 20 m;		Screw connector for local assembly on POF FOC (1 pack = 10 items)
		SIMATIC NET Manual Collection
		Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English

More information

You can order components supplementary to the SIMATIC NET cabling range from your local contact.

Technical advice on this subject is available from:

J. Hertlein A&D SE PS

Tel.: +49(0)911/750 44 65

Fax: +49(0)911/750 99 91

Email: juergen.hertlein@siemens.com

PROFINET/Industrial Ethernet

Passive network components

POF/PCF FOC termination kit

Overview



- Compact, rugged assembly case for POF and PCF fiber-optic cables
- Special versions for easy assembly of SC RJ plugs on POF and PCF fiber-optic cables
- The quality of the assembly can be checked using the enclosed microscope.

Benefits



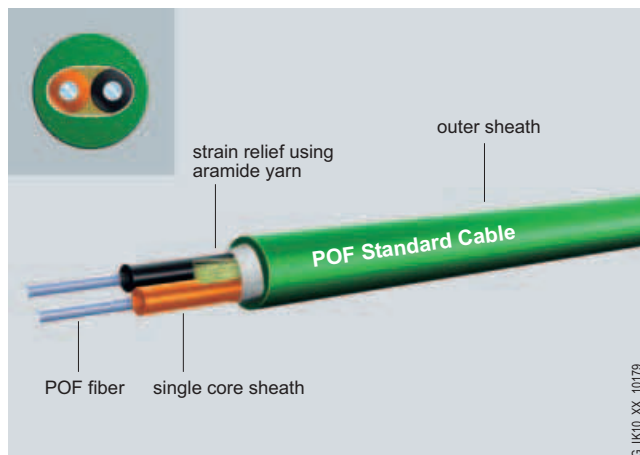
- Easy installation of the unassembled cables in industrial plants
- Flexible assembly of connectors on POF and PCF fiber optic cables on site (SC RJ connectors)
- Mistakes are prevented with easy visual inspection of the assembled connector on site using a microscope
- Simple repair of POF and PCF fiber optic cables in the field

Application

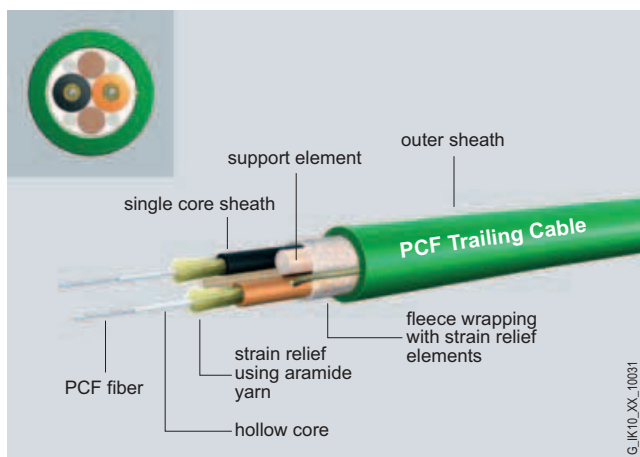
SIMATIC NET POF and PCF fiber optic cables are used to construct optical indoor and outdoor Ethernet/PROFINET networks. They are easy to assemble on-site with the Termination Kits and 2 x 2 RJ connectors. The maximum cable length between two Ethernet/PROFINET devices is 100 m for PCF and 50 m for POF fiber optic cables.

Ethernet/PROFINET devices with integral optical interface (SC RJ connection system) are e.g. SCALANCE X-200P IRT, ET200S.

Design



Cable construction POF plastic optical fiber



Cable construction PCF plastic optical fiber

The kit is available in assembly cases for on-site installation of SC RJ connectors on PCF plastic optical fiber.

It consists of a stripping tool, buffer stripping tool, Kevlar scissors, fiber breaking tool and microscope.

PROFINET/Industrial Ethernet

Passive network components

POF/PCF FOC termination kit

Ordering data	Order No.
Termination Kit SC RJ POF Plug Assembly case for on-site installation of SC RJ POF connectors; consisting of stripping tool, Kevlar cutters, SC RJ grinding plate, grinding paper, grinding base and microscope	6GK1 900-0ML00-0AA0
Termination Kit SC RJ PCF Plug Assembly case for local assembly of SC RJ POF connectors, comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, microscope	6GK1 900-0NL00-0AA0
Accessories	
IE SC RJ POF Plug 20 plugs for on-site assembly	6GK1 900-0MB00-0AC0
IE SC RJ PCF Plug 10 plugs for on-site assembly	6GK1 900-0NB00-0AC0
IE SC RJ POF refill set Refill set for Termination Kit SC RJ POF Plug consisting of grinding paper and grinding plate (set of 5)	6GK1 900-0MN00-0AA0

More information

You can order components supplementary to the SIMATIC NET cabling range from your local contact.

Technical advice on this subject is available from:

J. Hertlein, A&D SE PS

Tel.: +49(0)911/750 44 65

Fax: +49(0)911/750 99 91

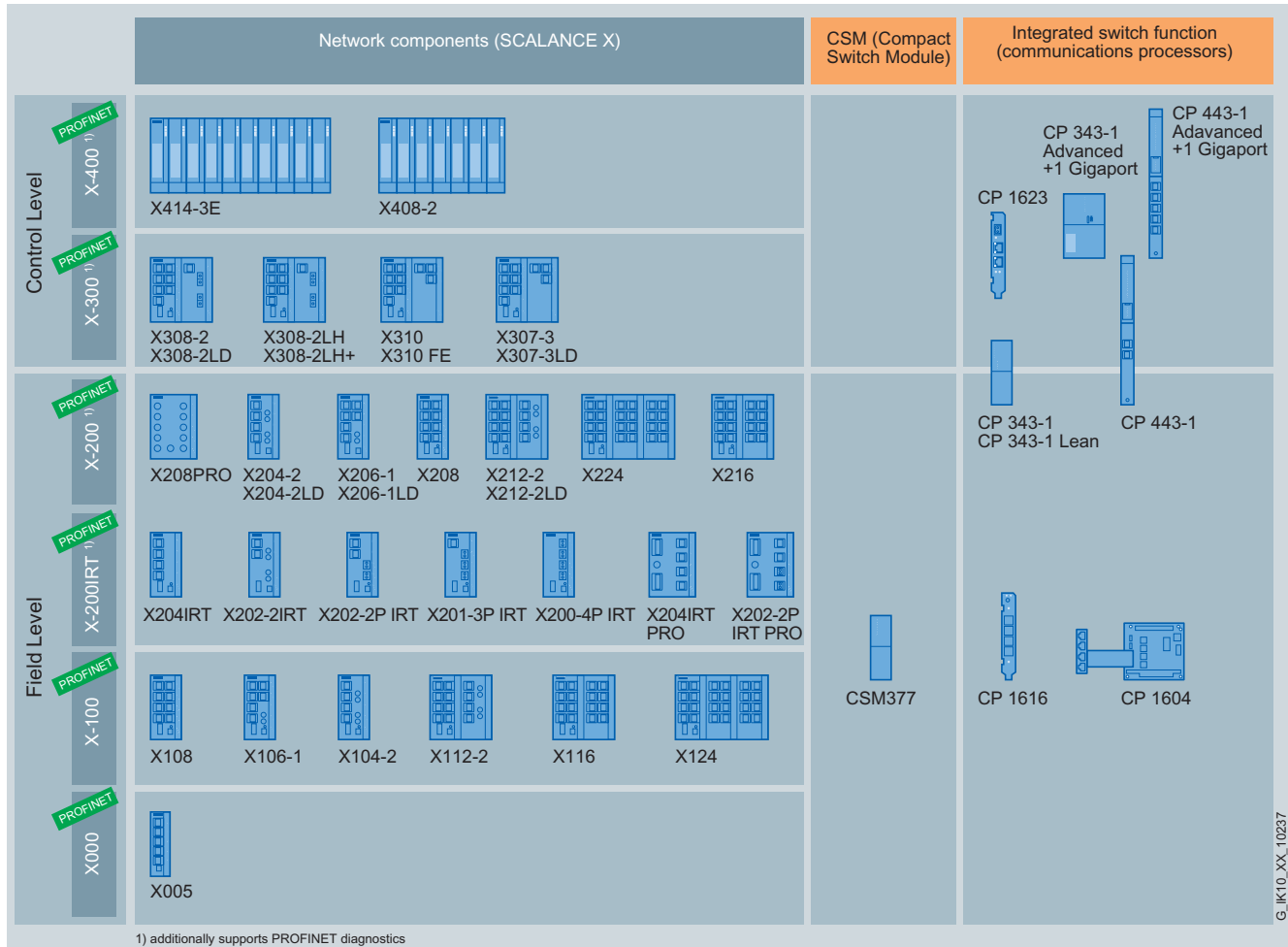
Email: juergen.hertlein@siemens.com

PROFINET/Industrial Ethernet

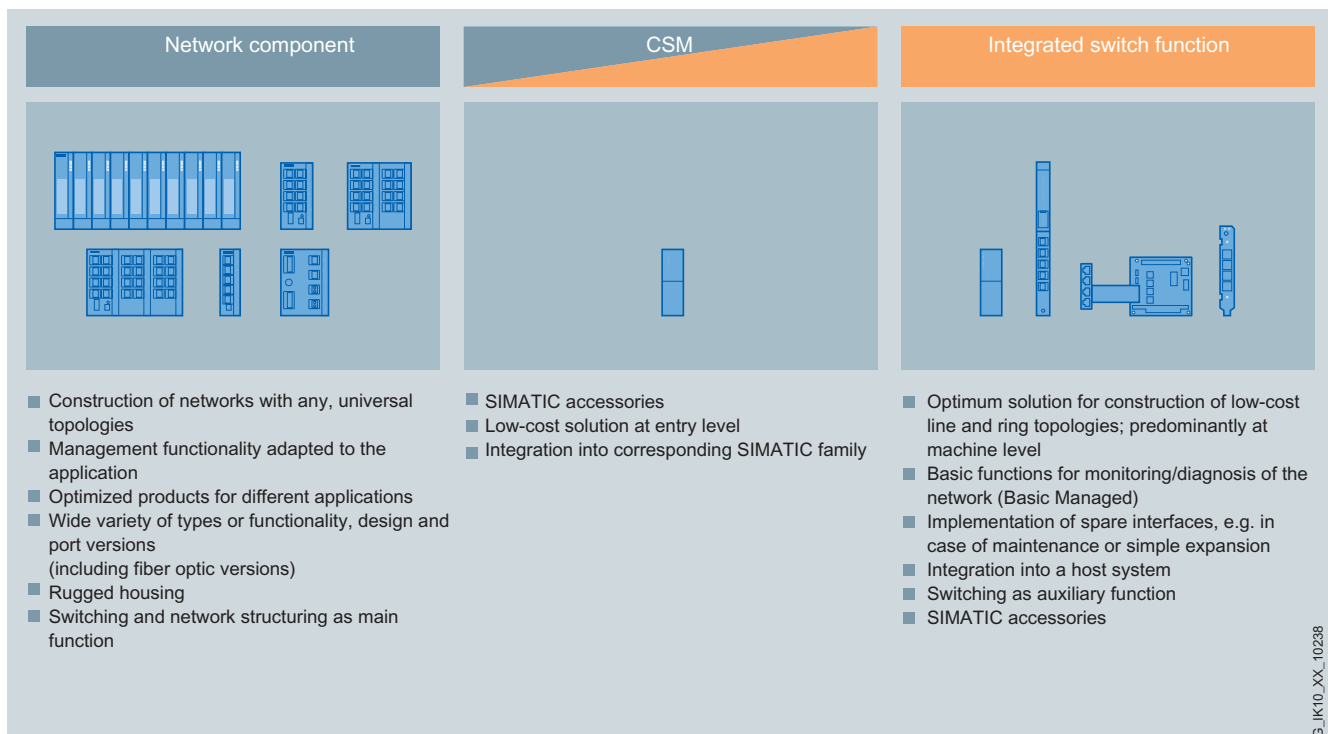
Industrial Ethernet Switches

Overview

Overview



Overview of SCALANCE X Industrial Ethernet switches and components with switch functionality



PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Overview

Overview (continued)

	Type of module	Type and number of ports										
		Gigabit Ethernet						Fast Ethernet				
		10 / 100 / 1000 Mbit/s	1000 Mbit/s				10 / 100 Mbit/s	100 Mbit/s				
		TP	Fiber Optic				TP	Fiber Optic				
		RJ45	Multi-mode SC (750m)	Single-mode SC (10km)	Long-haul SC (40km)	Long-haul+ SC (70km)	RJ45	M12	POF/PCF SCRJ (50m/100m)	Multi-mode BFOC (3km)	Single-mode BFOC (26km)	Long-haul SC (70km)
SCALANCE X-400	X414-3E	2	2 ⁴⁾	2 ⁴⁾	2 ⁴⁾	2 ⁴⁾	20 ³⁾			12 ³⁾	12 ³⁾	12 ³⁾
	X408-2	4	4 ⁴⁾	4 ⁴⁾	4 ⁴⁾	4 ⁴⁾	4			4 ¹⁾	4 ²⁾	4 ²⁾
SCALANCE X-300	X310	3					7					
	X310FE						10					
	X307-3		3				7					
	X307-3LD			3			7					
	X308-2	1	2				7					
	X308-2LD	1		2			7					
	X308-2LH	1			2		7					
	X308-2LH+	1				2	7					
SCALANCE X-200	X204IRT						4					
	X202-2IRT						2			2		
	X202-2P IRT						2		2			
	X201-3P IRT						1		3			
	X200-4P IRT								4			
	X204IRT PRO						4					
	X202-2P IRT PRO						2		2			
	X224						24					
	X216						16					
	X212-2						12			2		
	X212-2LD						12				2	
	X208						8					
	X208PRO							8				
	X206-1						6			1		
	X206-1LD						6				1	
	X204-2						4			2		
	X204-2LD						4				2	
SCALANCE X-100	X124						24					
	X116						16					
	X112-2						12			2		
	X108						8					
	X106-1						6			1		
	X104-2						4			2		
SCALANCE X005	X005						5					
Modules/CPs for SIMATIC S7-300	CSM377						4					
	CP343-1Lean						2					
	CP 343-1						2					
	CP 343-1 Advanced	1					2					
CPs for SIMATIC S7-400	CP 443-1						2					
	CP 443-1 Advanced	1					4					
	CP 1604						4					
CPs for PG/PC	CP 1616						4					
	CP 1623	2										

1) additionally connectable by means of multimode media modules

2) additionally connectable by means of singlemode media modules

1) and 2) no more than two 100 Mbit/s media modules can be connected

3) with extender module

4) additionally connectable by means of single or multimode media modules with SC connection

SCALANCE X Industrial Ethernet switches and components with switch functionality – Port configuration

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Overview

Overview (continued)

	Type of device	Hardware												
		Connection to S7 backplane bus	Format module S7	PC module	Rugged, compact housing	Modular design	Gigabit Ethernet	LED diagnosis	SIMATIC environment	Redundant power supply (2 x 24 V DC)	External supply for integrated switch	Signal contact	Local display (SET pushbutton)	C-PLUG slot
SCALANCE X-400	X414-3E					•	•	•	•	•		•	•	•
	X408-2					•	•	•	•	•		•	•	•
SCALANCE X-300	X310				•		•	•	•	•		•	•	•
	X310FE				•			•	•	•		•	•	•
	X307-3				•		•	•	•	•		•	•	•
	X307-3LD				•		•	•	•	•		•	•	•
	X308-2				•		•	•	•	•		•	•	•
	X308-2LD				•		•	•	•	•		•	•	•
	X308-2LH				•		•	•	•	•		•	•	•
	X308-2LH+				•		•	•	•	•		•	•	•
SCALANCE X-200	X204IRT				•			•	•	•		•	•	•
	X202-2IRT				•			•	•	•		•	•	•
	X202-2P IRT				•			•	•	•		•	•	•
	X201-3P IRT				•			•	•	•		•	•	•
	X200-4P IRT				•			•	•	•		•	•	•
	X204IRT PRO				•			•	•	•		•	•	•
	X202-2P IRT PRO				•			•	•	•		•	•	•
	X224				•			•	•	•		•	•	•
	X216				•			•	•	•		•	•	•
	X212-2				•			•	•	•		•	•	•
	X212-2LD				•			•	•	•		•	•	•
	X208				•			•	•	•		•	•	•
	X208PRO				•			•	•	•		•	•	•
	X206-1				•			•	•	•		•	•	•
	X206-1LD				•			•	•	•		•	•	•
	X204-2				•			•	•	•		•	•	•
	X204-2LD				•			•	•	•		•	•	•
SCALANCE X-100	X124				•			•	•	•		•	•	
	X116				•			•	•	•		•	•	
	X112-2				•			•	•	•		•	•	
	X108				•			•	•	•		•	•	
	X106-1				•			•	•	•		•	•	
	X104-2				•			•	•	•		•	•	
SCALANCE X-000	X005				•			•	•					

• applies

Overview of the functions of the SCALANCE X Industrial Ethernet switches – Hardware

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Overview

Overview (continued)

	Type of device	Hardware												
		Connection to S7 backplane bus	Format module S7	PC module	Rugged, compact housing	Modular design	Gigabit Ethernet	LED diagnosis	SIMATIC environment	Redundant power supply (2 x 24 V DC)	External supply for integrated switch	Signal contact	Local display (SET pushbutton)	C-PLUG slot
Module	CSM 377		•					•	•		•			
CPs for SIMATIC S7-300	CP 343-1 Lean	•	•					•	•		•			
	CP 343-1	•	•					•	•		•			
	CP 343-1 Advanced	•	•				•	•	•		•			•
CPs for SIMATIC S7-400	CP 443-1	•	•					•	•					
	CP 443-1 Advanced	•	•				•	•	•					•
CPs for PG/PC	CP 1623 (PCIe)			•			•	•		• ¹⁾	•			•
	CP 1604 (PC/104-Plus)			•				•			•			•
	CP 1616 (PCI)			•				•			•			•

• applies

1) 3.3/12 V DC using PCIe interface, 12 - 24 V DC over external power supply

Overview of the functions of the Industrial Ethernet components with switch functionality – Hardware

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Overview

Overview (continued)

		Software																										
	Type of device	PROFINET diagnosis	Topology support (LLDP)	Command Line Interface / Telnet	Web-based management	Configuration with STEP 7	SNMP	Ring redundancy incl. RM functionality	Standby redundancy	IRT capability	VLAN (Virtual Local Area Network)	GVRP (Generic VLAN Registration Protocol)	STP/ RSTP (Spanning Tree Protocol/ Rapid Spanning Tree Protocol)	Passive listening	Forward Clock Synchronization (SNTP, NTP, SICLOCK)	IGMP Snooping/Querier (Internet Group Management Protocol)	GMRP (Generic Multicast Protocol)	Broadcast/Multicast/Unicast Limiter	Broadcast Blocking	DHCP Option 82 (Dynamic Host Configuration Protocol)	IP Access List	Access Control List (MAC)	IEEE 802.1x (Radius)	Link Aggregation	Static Routing	RIPv2 (Dynamic Routing)	OSPFv2 (Dynamic Routing)	VRPP, Router Redundancy (Virtual Router Redundancy Protocol)
Module	CSM 377																											
CPs for SIMATIC S7-300	CP 343-1 Lean	●	●		¹⁾	●	●								●						●							
	CP 343-1	●	●		¹⁾	●	●	●							●						●							
	CP 343-1 Advanced	●	●		¹⁾	●	●	●	●	●					●						●			●				
CPs for SIMATIC S7-400	CP 443-1	●	●		¹⁾	●	●	●	●	●					●						●							
	CP 443-1 Advanced	●	●		¹⁾	●	●	●	●	●					●						●			●				
CPs for PG/PC	CP 1623 (PCIe)					●	●								●													
	CP 1604 (PC/104-Plus)	●	●		¹⁾	●	●	●	●	●																		
	CP 1616 (PCI)	●	●		¹⁾	●	●	●	●	●																		G_IK10_XX_10243

• applies

¹⁾ Port diagnosis possible by means of integrated web server

Overview of the functions of the Industrial Ethernet components with switch functionality – Software

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Compact Switch Module CSM 377

Overview



- For the connection of a SIMATIC S7-300 with integral PROFINET interface or with an Industrial Ethernet CP or ET 200M to an Industrial Ethernet in an electrical linear, tree or star structure
- As many as three additional nodes can be connected
- As an unmanaged switch, the CSM 377 is used for integrating small machines into existing automation networks or for the standalone operation of the machines
- Simple, space-saving attachment to S7-300 mounting rail due to design as single-width module in S7-300 format
- Economical solution for the implementation of small, local Ethernet networks
- Rugged, industry-standard node connections with PROFINET-compliant RJ45 connectors that latch onto the enclosure to offer additional strain and bending relief

Benefits



- Quick and easy connection of a SIMATIC S7-300 or ET 200M to electrical Industrial Ethernets in linear, tree or star structures by means of three additional RJ45 sockets
- Ideal solution for the implementation of small local Ethernets with a SIMATIC S7-300 station
- Secure data communication by means of industry standard device connection with PROFINET-compliant connector IE FC RJ45 Plug 180 and latching of the connector to the enclosure to provide additional strain relief
- Low-maintenance operation thanks to fanless construction
- Quick and easy diagnosis by means of LEDs on the device
- Use of uncrossed connection cables possible by means of integrated autocrossover function

Application

- For the economical construction of small, electrical Industrial Ethernets with star, tree and linear structures using a SIMATIC S7-300 or ET 200M

Design

The compact switch module CSM 377 features all the advantages of the SIMATIC S7-300 design:

- Compact construction;
the rugged plastic enclosure features the following on the front panel:
 - 4 x RJ45 sockets for the connection to Industrial Ethernet (support collar)
 - 1 x 2-pin pluggable terminal strip for the connection of the external 24 VDC power supply
 - LED indicators for diagnosis and status indication of the Industrial Ethernet ports
- 10/100BaseTX;
automatic detection of the data rate with autosensing and autocrossover function for the connection of IE FC cables by means of IE FC RJ45 Plug 180 up to 100 m
- Simple mounting;
the CSM 377 switch module is mounted on the mounting rail of the S7-300. As it has no connection to the backplane bus of the S7-300 or ET 200M, it must either be inserted at the beginning (first module to the left of the CPU) or at the end (last module on far right) of the S7-300 station. The connection to the CPU of the S7-300 is either by means of an Industrial Ethernet cable or an Industrial Ethernet twisted pair cord.
- Three further Industrial Ethernet interfaces (TP ports) are available for the connection of additional Ethernet nodes such as HMI panels or ET 200
- The CSM 377 can be operated without a fan and no backup battery is necessary
- The module can be replaced without a programming device

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Compact Switch Module CSM 377

Function

- Connection of a SIMATIC S7-300 to a higher-level electrical network in a linear, tree or point-to-point structure
- Construction of a small local network with one SIMATIC S7-300 and three other Ethernet nodes

Thanks to the switching technology used, the CSM 377 is suitable for use in PROFINET networks, but offers no additional PROFINET functions, i.e. no integration into the PROFINET diagnostics.

Network topology and network configuration

When configuring the network, it is necessary to observe the following boundary conditions:

- Length of the TP cable between two nodes:
 - max. 100 m with Industrial Ethernet FastConnect cable and IE FC RJ45 Plug 180; of which no more than 10 m by means of patching with TP cord

Configuration

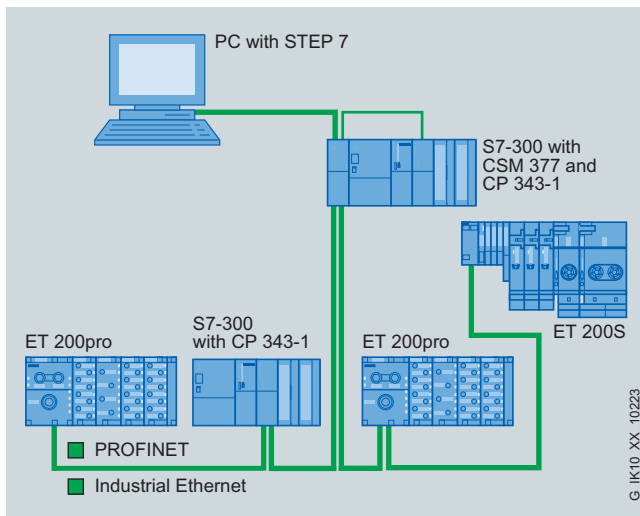
The Compact Switch Module CSM 377 is an unmanaged switch and requires no configuration.

Diagnostics

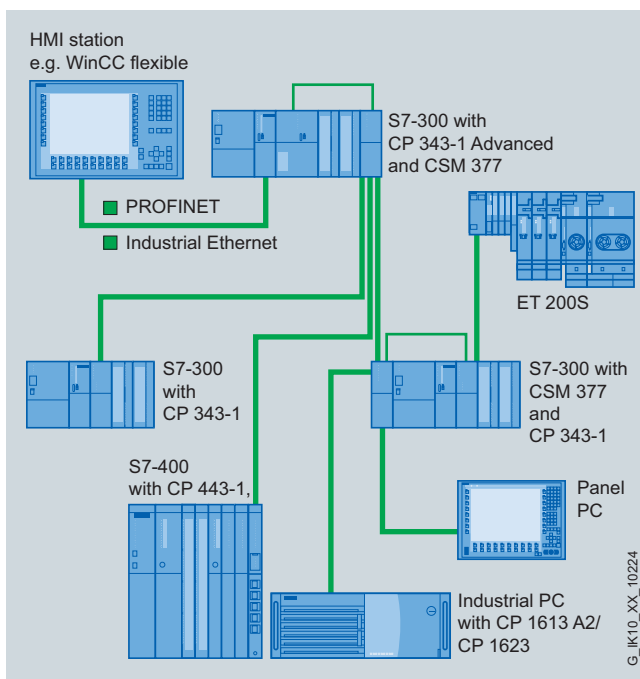
The following information is indicated on the device by means of LEDs:

- Power
- Port status
- Data traffic

2



Connection of SIMATIC S7-300 with CSM 377 to Industrial Ethernet with linear structure



Construction of a local Industrial Ethernet with SIMATIC S7-300 and CSM 377 in a point-to-point structure

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Compact Switch Module CSM 377

Technical specifications

Order No.	6GK7 377-1AA00-0AA0
Product type description	CSM 377
Transfer rate	
• Transfer rate 1	10 Mbit/s
• Transfer rate 2	100 Mbit/s
Number of electrical connections	
• for signaling contact	-
• for network components or terminals	4
• for voltage supply	1
Electrical connection version	
• for signaling contact	-
• for network components or terminals	RJ45 socket (10/100 Mbit/s; half/full duplex)
• for voltage supply	2-pin terminal block
Version of the C-PLUG swap medium	No
Type of supply voltage	DC
Supply voltage	24 V
• Maximum	28,8 V
• Minimum	19,2 V
Current consumed	70 mA
Effective power loss	
• at 24 V DC	1.6 W
• Maximum	-
Ambient temperature	
• during operation	0 °C ... + 60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Width	40 mm
Height	125 mm
Depth	118 mm
Net weight	200 g
Type of fixing	DIN rail, S7-300 mounting rail
Degree of protection	IP20

Ordering data

Order No.

Compact Switch Module CSM 377

Unmanaged switch for the connection of a SIMATIC S7-300, ET200M and as many as three other nodes to an Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module incl. electronic equipment manual on CD-ROM

6GK7 377-1AA00-0AA0

Accessories

IE TP Cord RJ45/RJ45

TP cable 4 x 2 with 2 RJ45 connectors

- 0.5 m

6XV1 870-3QE50

IE FC TP standard cable GP 2 x 2 (Type A)

4-core, shielded TP installation cable for connection to IE FC outlet RJ45/ IE FC RJ45 plug; PROFINET-compliant; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m

6XV1 840-2AH10

IE FC trailing cable 2 x 2 (Type C)

4-core, shielded TP installation cable for connection to IE FC outlet RJ45/ IE FC RJ45 plug 180/90 for tow chain use; PROFINET-compliant; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m

6XV1 840-3AH10

IE FC RJ45 Plug 180

RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

IE FC stripping tool

Pre-adjusted stripping tool for the fast stripping of Industrial Ethernet FC cables

6GK1 901-1GA00

IE FC RJ45 outlet

For connecting Industrial Ethernet FC cables and TP Cords; block pricing for quantities of more than 10 or 50 units

6GK1 901-1FC00 0AA0

SIMATIC NET Manual Collection

Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English

6GK1 975-1AA00-3AA0

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X005 unmanaged

Overview



- The unmanaged Industrial Ethernet Entry Level Switch SCALANCE X005 is optimized for low-cost installation of small Industrial Ethernet networks with 10/100 Mbit/s in a line and star topology
- Five electrical nodes or network connections
- Rugged metal housing for space-saving cubicle mounting on standard rails, S7-300 DIN rail or for wall mounting
- Rugged, industry-standard station connections with PROFINET-compatible RJ45 connectors that offer additional strain relief and bending strain relief thanks to latching on the housing
- Diagnostics on the device by means of LEDs (power, link status, data communication)

Benefits



- Ideal solution for configuring Industrial Ethernet line and star topologies
- Space-saving installation in the cabinet thanks to the compact design in S7-300 format
- Secure data communication by means of industry standard device connection with PROFINET-compliant connector IE FC RJ45 Plug 180 and latching of the connector to the enclosure to provide additional strain relief
- Installation is possible without a patch field by means of IE FC RJ45 Plug 180 and IE FC Standard Cable
- Quick and easy diagnosis by means of LEDs on the device
- Low-maintenance operation thanks to fanless construction
- Use of uncrossed connection cables possible by means of integrated autocrossover function
- Easy network configuration without runtime calculation

Application

- For low-cost installation of small, electrical Industrial Ethernet star and line structures with switching functionality, e.g. machine or plant islands
- For installation in the control cabinet

Design

The SCALANCE Industrial Ethernet switches with a rugged metal housing (IP30) are optimized for mounting on a standard rail and an S7-300 DIN rail. Direct wall mounting in different positions is also possible. Due to the housing dimensions that correspond to those of the SIMATIC S7-300, the devices are very well suited for integration into an automation solution using S7-300 components.

The SCALANCE X005 switch is equipped with:

- Supply voltage (1 x 24 V DC)
- A row of LEDs for displaying status information (power, link status, data communication)
- 10/100BaseTX, RJ45 port: RJ45 port, automatic detection of the data rate (10 or 100 Mbit/s), with Autosensing and Autocrossover function for connecting IE FC cables via IE FC RJ45 Plug 180 over distances up to 100 m

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X005 unmanaged

Function

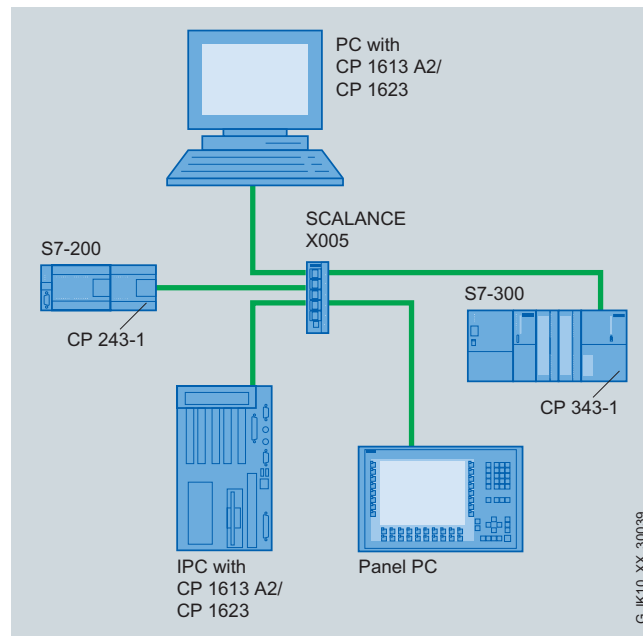
- Uncrossed connecting cables can be used due to Autocross-over function integrated in the ports
- Network load disconnection through integral switch functionality

Network topology and network configuration

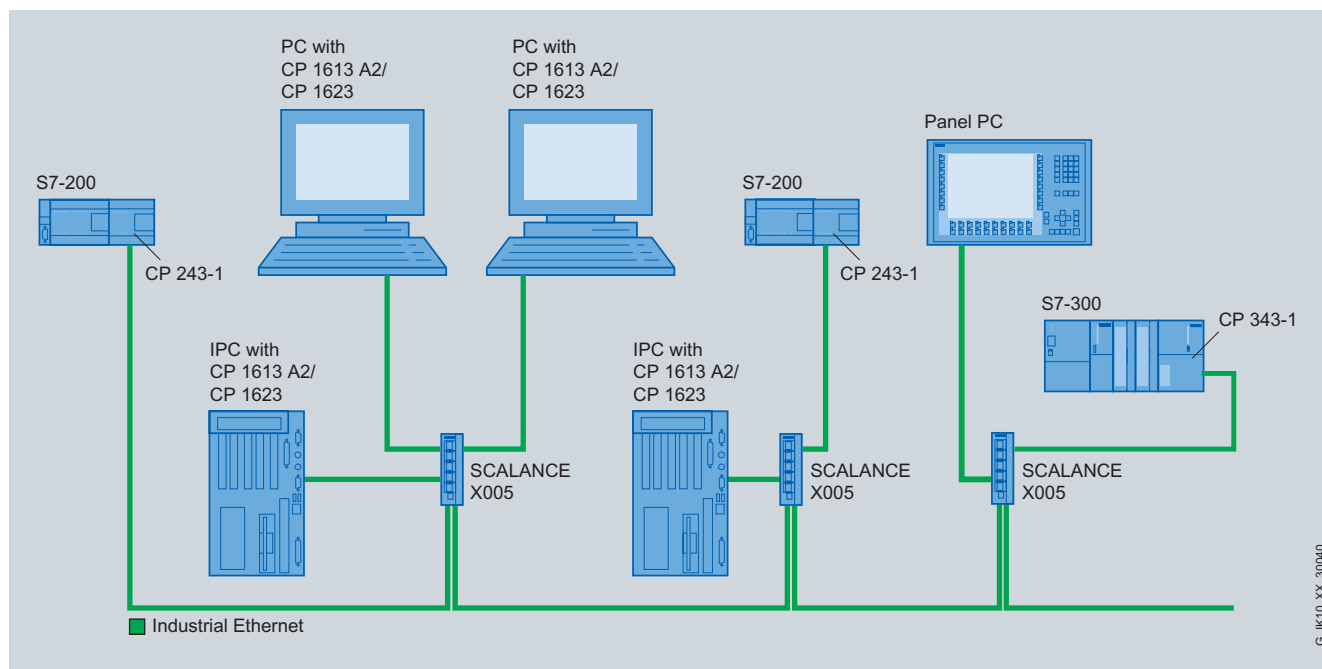
The SCALANCE X005 is typically accommodated in one control cubicle together with the nodes to be connected. It can be operated in small electrical star and line topologies. Network configuration and expansion are easy to implement; there are no limitations with the cascading of SCALANCE X005.

When configuring the network, it is necessary to observe the following boundary conditions:

- Length of the TP cable between two SCALANCE X switches:
- Max. 100 m with Industrial Ethernet FastConnect products



Star-shaped network topology with SCALANCE X005



Electrical line topology with SCALANCE X005

Diagnostics

The following information is displayed on site by LEDs:

- Port status
- Data traffic

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X005 unmanaged

Technical specifications

Order No.	6GK5 005-0BA00-1AA3
Product type description	SCALANCE X005
Transfer rate	-
• Transfer rate 1	10 Mbit/s
• Transfer rate 2	100 Mbit/s
Number of electrical connections	-
• for signaling contact	-
• for network components or terminals	5
• for voltage supply	1
Electrical connection version	-
• for network components or terminals	RJ45 socket (10/100 Mbit/s; TP)
• for voltage supply	2-pin terminal block
• for signaling contact	-
Number of optical ports for fiber-optic cables	-
• at 100 Mbit/s	-
• at 10 Mbit/s	-
Version of optical port for fiber-optic cables	-
• at 10 Mbit/s	-
• at 100 Mbit/s	-
Version of the C-PLUG swap medium	No
Type of supply voltage	DC
Supply voltage	24 V
• external	24 V
• Maximum	32 V
• Minimum	18 V
Current consumed	80 mA
Effective power loss	-
• at 24 V DC	2,0 W
Ambient temperature	-
• during operation	0 ... +65 °C
• during storage	-40 ... +80 °C
• during transport	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%
Width	40 mm
Height	125 mm
Depth	124 mm
Net weight	550 g
Type of fixing	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30
Standard	-
• for EMI of FM	-
• For Ex zone	-
• for safety of CSA	-
• For emitted interference	EN 61000-6-2 (Class A)
• For noise immunity	EN 61000-6-4

Order No.	6GK5 005-0BA00-1AA3
Product type description	SCALANCE X005
Directive	-
• for C-Tick	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950, CSA C22.2 Nr. 60950
Certificate of suitability	EN 61000-6-2, EN 61000-6-4
• CE label	Yes
Marine classification association	-
• American Bureau of Shipping (ABS),	-
• Bureau Veritas (BV)	-
• Det Norske Veritas (DNV)	-
• Germanischer Lloyd (GL)	-
• Lloyds Register of Shipping (LRS)	-
• Nippon Kaiji Kyokai (NK)	-

Ordering data

Order No.

SCALANCE X005

6GK5 005-0BA00-1AA3

Industrial Ethernet Switch for 10/100 Mbit/s; with five 10/100 Mbit/s RJ45 ports for configuring small star and line structures

Accessories

IE FC RJ45 plugs

RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables

IE FC RJ45 Plug 180

180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface

- 1 pack = 1 items
- 1 pack = 10 items
- 1 pack = 50 items

6GK1 901-1BB10-2AA0
6GK1 901-1BB10-2AB0
6GK1 901-1BB10-2AE0

IE FC RJ45 Plug 145

145° cable outlet; e.g. for SIMOTION and SINAMICS

- 1 pack = 1 items
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB30-0AA0
6GK1 901-1BB30-0AB0
6GK1 901-1BB30-0AE0

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-100 unmanaged

Overview



- The unmanaged Industrial Ethernet switches of the SCALANCE X-100 product line are optimized for installing Industrial Ethernet networks with 10/100 Mbit/s in a line and star topology
- Electrical or optical connection to stations or network in accordance with the port type of the devices
- Rugged metal housing for space-saving cabinet mounting on standard rails, S7-300 DIN rail or for wall mounting
- Rugged, industry-standard station connections with PROFINET-compatible RJ45 connectors that offer additional strain relief and bending strain relief thanks to latching on the housing
- Redundant power supply
- Diagnostics on the device by means of LEDs (power, link status, data communication)
- Error signaling contact with easy adjustment using the SET button

Benefits



- Ideal solution for configuring Industrial Ethernet line and star topologies
- Space-saving installation in the cabinet thanks to the compact design in S7-300 format
- Secure data communication by means of industry standard device connection with PROFINET-compliant connector IE FC RJ45 Plug 180 and latching of the connector to the housing to provide additional strain relief
- Installation is possible without a patch field by means of IE FC RJ45 Plug 180 and IE FC Standard Cable
- Simple and fast diagnostics via LED on device and signaling contact
- Low-maintenance operation thanks to fanless construction
- Use of uncrossed connection cables possible by means of integrated autocrossover function
- Easy network configuration without runtime calculation

Application

The switches of the SCALANCE X-100 product line support the inexpensive construction of Industrial Ethernet line or star topologies with switching functions. They are designed for operation in the control cabinet.

Product versions

SCALANCE X104-2 / SCALANCE X106-1 / SCALANCE X112-2

- Construction of optical Industrial Ethernet line or star topologies:
 - SCALANCE X104-2; line or star topologies with 4 electrical ports and 2 optical ports
 - SCALANCE X106-1; star topologies with 6 electrical ports and 1 optical port
 - SCALANCE X112-2; line or star topologies with 12 electrical ports and 2 optical ports
- Diagnostics on the device using LEDs (power, link status, data traffic) and signaling contact (alarm screen form can be set using a button on the device)
- The four (SCALANCE X104-2), six (SCALANCE X106-1) or twelve (SCALANCE X112-2) RJ45 sockets are designed to be industry-compatible with additional holding collars for connection of the IE FC RJ45 Plug 180

SCALANCE X108 / SCALANCE X116 / SCALANCE X124

- Construction of electrical Industrial Ethernet star and line topologies
 - SCALANCE X108; with eight electrical ports
 - SCALANCE X116; with 16 electrical ports
 - SCALANCE X124; with 24 electrical ports
- Diagnostics on the device using LEDs (power, link status, data traffic) and signaling contact (alarm screen form can be set using a button on the device)
- The RJ45 sockets are designed to be industry-compatible with additional holding collars for connection of the IE FC RJ45 Plug 180

Design

The SCALANCE Industrial Ethernet switches with a rugged metal housing are optimized for mounting on a standard rail and an S7-300 rail. Direct wall mounting in various positions is also possible. Due to the dimensions of the housing that conform to those of SIMATIC S7-300, the devices are optimized for integration in an automation solution with S7-300 components.

The SCALANCE X-100 switches have:

- A 4-pole terminal block for connecting the redundant supply voltage (2 x 24 V DC).
- A row of LEDs to indicate the status information (power, link status, data communication, signaling contact)
- A 2-pole terminal block for connecting the isolated signaling contact
- A SET button for on-site configuration of the signaling contact

The following port types are available:

- *10/100BaseTX, RJ45 connection*: RJ45 socket, automatic detection of the data rate (10 or 100 Mbit/s), with Autosensing and Autocrossover functions for connecting IE FC cables using IE FC RJ45 Plug 180 up to 100 m.
- *100BaseFX, BFOC connection technique*: BFOC sockets for direct connection to Industrial Ethernet glass fiber-optic cables up to 3000 m for configuring line and star topologies.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-100 unmanaged

Function

- Construction of electrical and optical Industrial Ethernet line or star topologies
- Use of uncrossed connecting leads is possible due to integrated auto-crossover function of the ports
- Isolation of the load due to integrated switch functions
- Easy network configuration and network expansion; no limitation of the expansion of the network when switches of the SCALANCE X-100 product line are cascaded

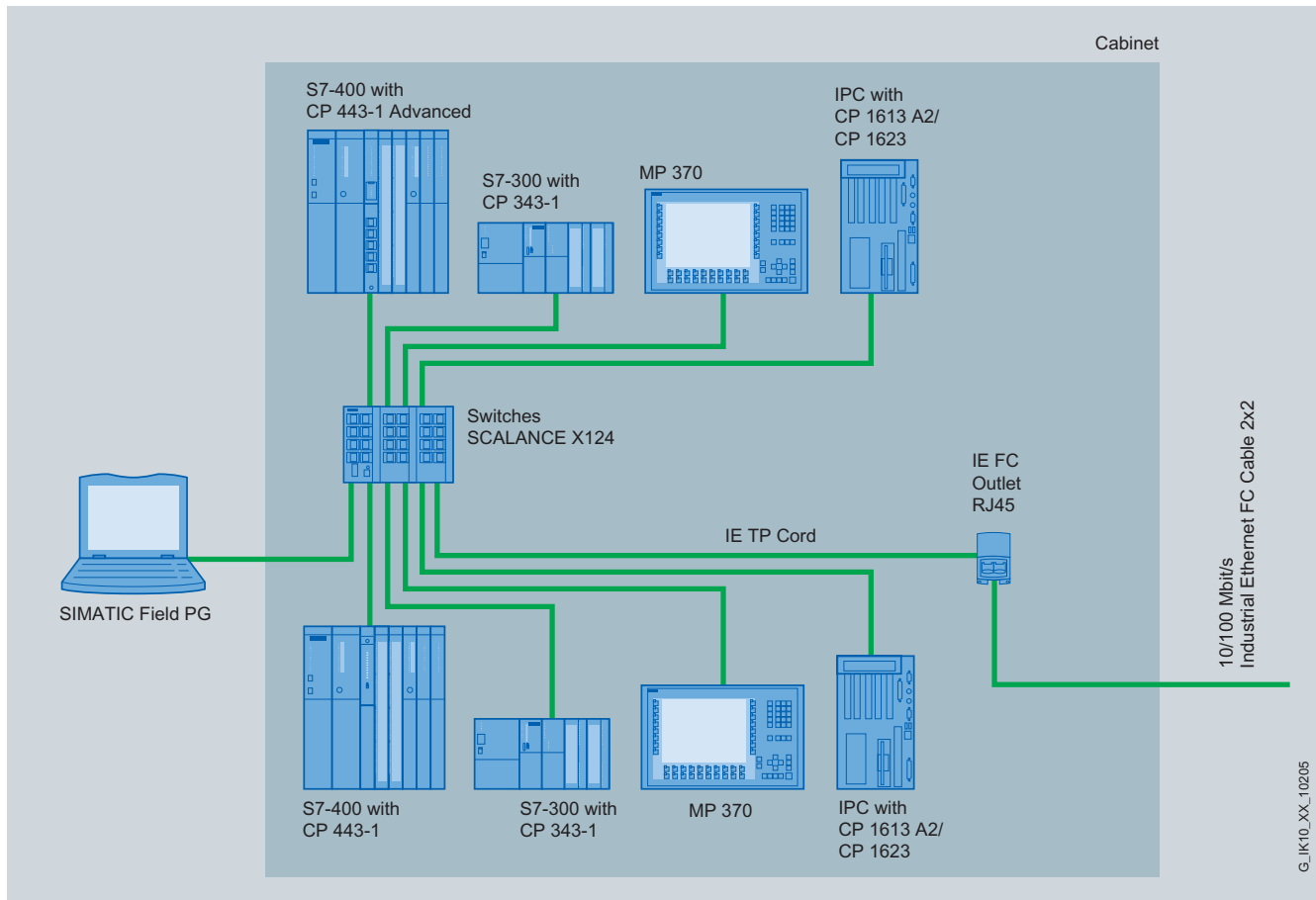
Network topology and network configuration

The SCALANCE X-100 switches are typically installed with the stations to be connected in a control cabinet. They can be mixed electrically and optically in star and line topologies.

When configuring the network, it is necessary to observe the following boundary conditions:

- Length of the TP cable between SCALANCE X switches:
 - Max. 100 m with Industrial Ethernet FastConnect products
- Length of the fiber-optic cables:
 - Max. 3000 m with Industrial Ethernet glass fiber-optic cables

2



Star-shaped network topology with SCALANCE X124

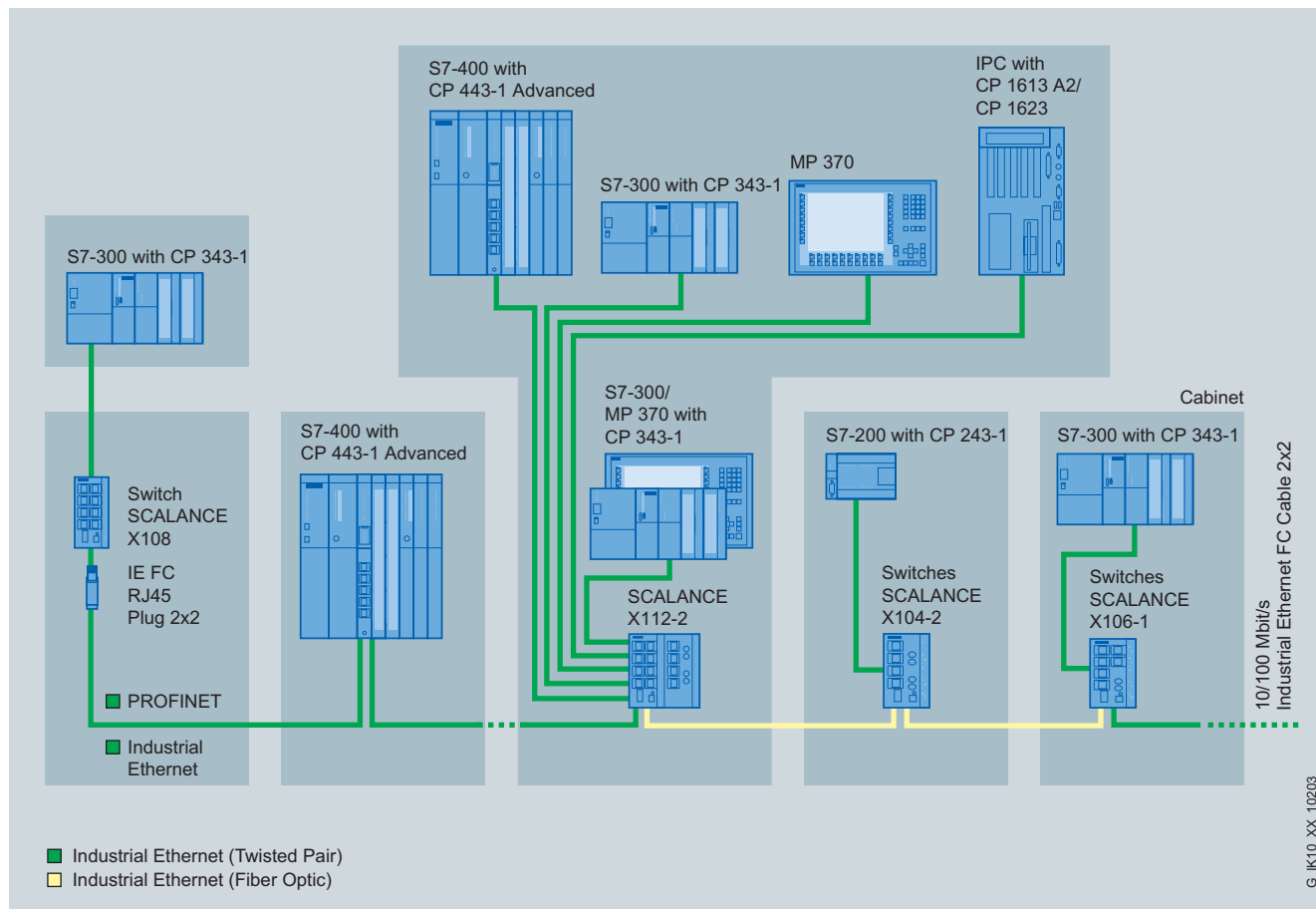
PROFINET/Industrial Ethernet

Industrial Ethernet Switches

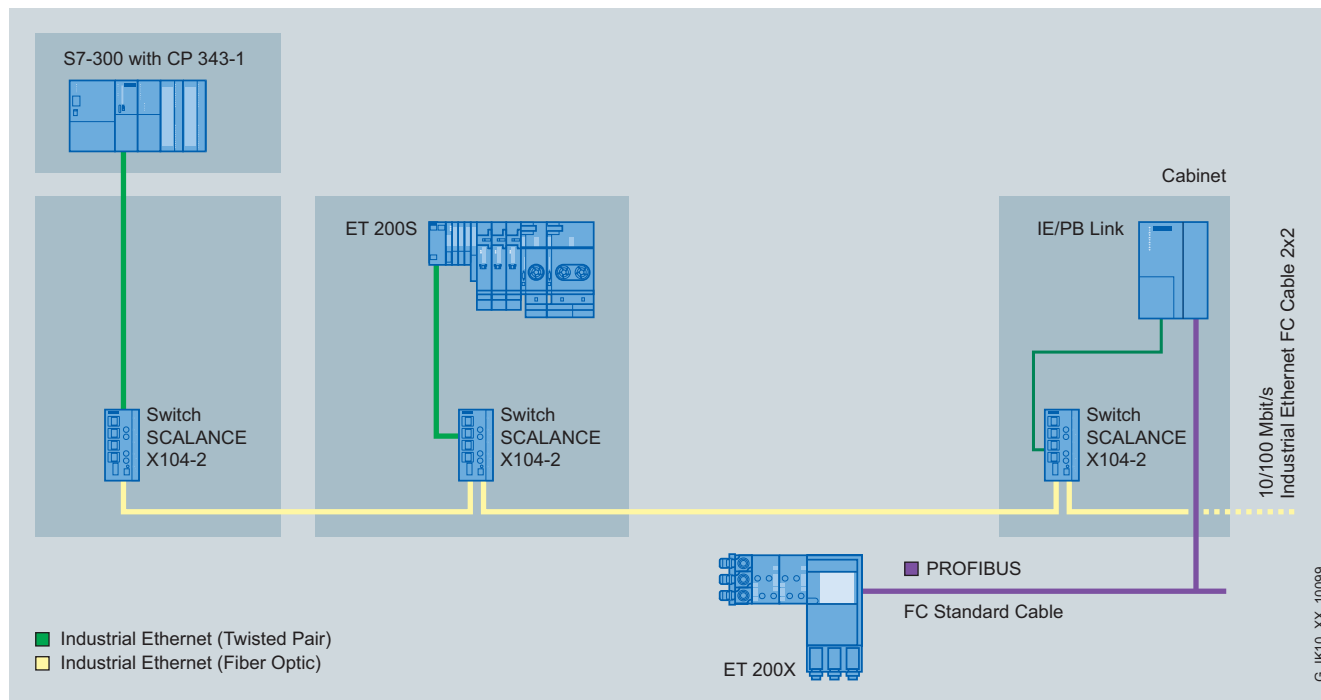
SCALANCE X-100 unmanaged

Function (continued)

2

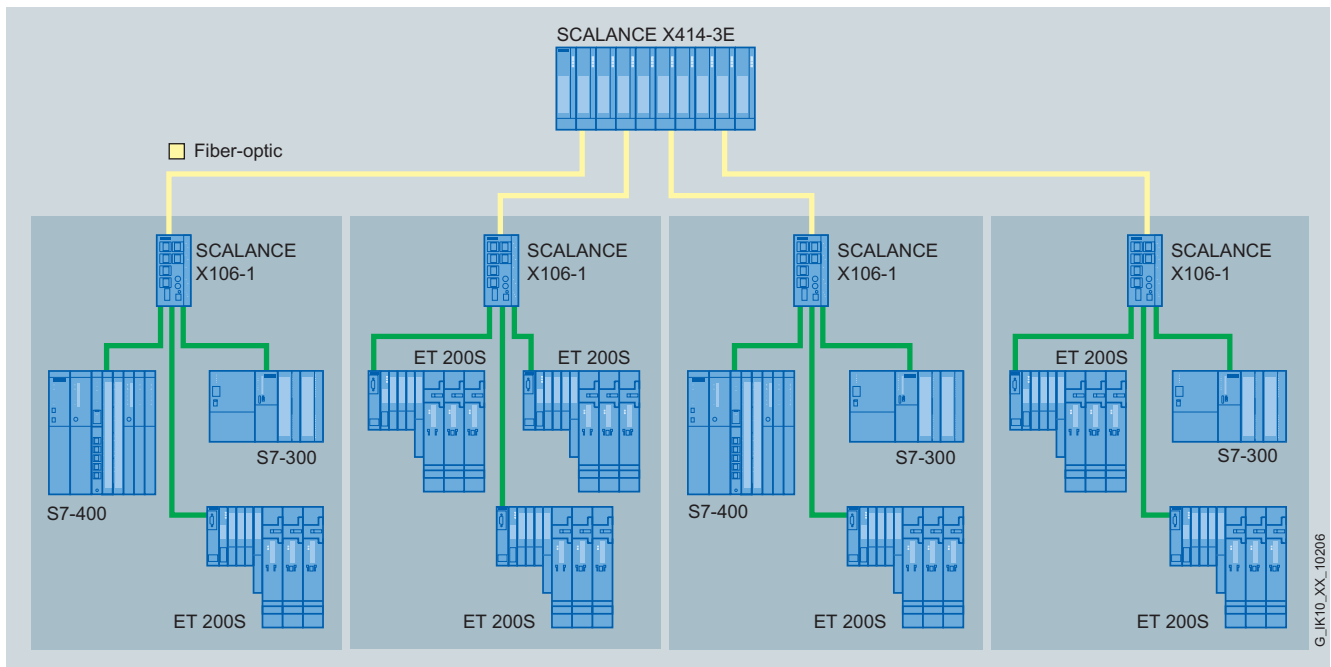


Electrical and optical line topology with SCALANCE X108, SCALANCE X112-2, SCALANCE X104 and SCALANCE X106-1



Optical line topology with SCALANCE X104-2

Function (continued)



Optical star topology with SCALANCE X106-1

Diagnostics

The following information is displayed by LEDs on site:

- Power
- Port status
- Data traffic

The Industrial Ethernet switches of the SCALANCE X-100 line can also be monitored over the floating signaling contact.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-100 unmanaged

Technical specifications

Order No.	6GK5 104-2BB00-2AA3	6GK5 106-1BB00-2AA3	6GK5 108-0BA00-2AA3
Product type description	SCALANCE X104-2	SCALANCE X106-1	SCALANCE X108
Transfer rate			
• Transfer rate 1	10 Mbit/s	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s	100 Mbit/s
Number of electrical connections			
• for signaling contact	1	1	1
• for network components or terminals	4	6	8
• for redundant voltage supply	1	1	1
• for voltage supply	1	1	1
Electrical connection version			
• for signaling contact	2-pin terminal block	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 socket (10/100 Mbit/s; TP)	RJ45 socket (10/100 Mbit/s; TP)	RJ45 socket (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables			
• at 10 Mbit/s	-	-	-
• at 100 Mbit/s	2	1	-
Version of optical port for fiber-optic cables			
• at 10 Mbit/s	-	-	-
• at 100 Mbit/s	BFOC sockets (100 Mbit/s)	BFOC sockets (100 Mbit/s)	-
Version of the C-PLUG swap medium	No	No	No
Type of supply voltage	DC	DC	DC
Supply voltage	24 V	24 V	24 V
• external	24 V	24 V	24 V
- Maximum	32 V	32 V	32 V
- Minimum	18 V	18 V	18 V
Current consumed	175 mA	150 mA	140 mA
Effective power loss			
• at 24 V DC	4.2 W	3.6 W	3.36 W
Ambient temperature			
• during operation	-10 ... +60 °C	-10 ... +60 °C	-20 ... +70 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%	95%
Width	60 mm	60 mm	60 mm
Height	125 mm	125 mm	125 mm
Depth	124 mm	124 mm	124 mm
Net weight	780 g	780 g	780 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30	IP30

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-100 unmanaged

Technical specifications (continued)

Order No.	6GK5 104-2BB00-2AA3	6GK5 106-1BB00-2AA3	6GK5 108-0BA00-2AA3
Product type description	SCALANCE X104-2	SCALANCE X106-1	SCALANCE X108
Standard			
• for EMI of FM	FM 3611	FM 3611	FM 3611
• For Ex zone	EN 50012	EN 50012	EN 50012
• for safety of CSA	-	-	-
• For emitted interference	EN 61000-6-4 (Class A)	EN 61000-6-4 (Class A)	EN 61000-6-4 (Class A)
• For noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Directive			
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes	Yes
Marine classification association			
• American Bureau of Shipping Europe Ltd.(ABS)	Yes	Yes	Yes
• Bureau Veritas (BV)	-	-	-
• Det Norske Veritas (DNV)	Yes	Yes	Yes
• Germanischer Lloyd (GL)	Yes	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes	Yes
• Nippon Kaiji Kyokai (NK)	Yes	Yes	Yes

Order No.	6GK5 112-2BB00-2AA3	6GK5 116-0BA00-2AA3	6GK5 124-0BA00-2AA3
Product type description	SCALANCE X112-2	SCALANCE X116	SCALANCE X124
Transfer rate			
• Transfer rate 1	10 Mbit/s	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s	100 Mbit/s
Number of electrical connections			
• for signaling contact	1	1	1
• for network components or terminals	12	16	24
• for redundant voltage supply	1	1	1
• for voltage supply	1	1	1
Electrical connection version			
• for network components or terminals	RJ45 socket (10/100 Mbit/s; TP)	RJ45 socket (10/100 Mbit/s; TP)	RJ45 socket (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block	4-pin terminal block
• for signaling contact	2-pin terminal block	2-pin terminal block	2-pin terminal block
Number of optical ports for fiber-optic cables			
• at 10 Mbit/s	-	-	-
• at 100 Mbit/s	2	-	-
Version of optical port for fiber-optic cables			
• at 10 Mbit/s	-	-	-
• at 100 Mbit/s	BFOC sockets (100 Mbit/s)	-	-
Version of the C-PLUG swap medium	No	No	No

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-100 unmanaged

Technical specifications (continued)

Order No.	6GK5 112-2BB00-2AA3	6GK5 116-0BA00-2AA3	6GK5 124-0BA00-2AA3
Product type description	SCALANCE X112-2	SCALANCE X116	SCALANCE X124
Type of supply voltage	DC	DC	DC
Supply voltage	24 V	24 V	24 V
• external	24 V	24 V	24 V
- Maximum	32 V	32 V	32 V
- Minimum	18 V	18 V	18 V
Current consumed	450 mA	300 mA	450 mA
Effective power loss			
• at 24 V DC	10.8 W	7.2 W	10.8 W
Ambient temperature			
• during operation	-10 ... +70 °C	-20 ... +70 °C	-20 ... +70 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%	95%
Width	120 mm	120 mm	180 mm
Height	125 mm	125 mm	125 mm
Depth	124 mm	124 mm	124 mm
Net weight	1100 g	1100 g	1500 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30	IP30
Standard	-	-	-
• for EMI of FM	FM 3611	FM 3611	FM 3611
• For Ex zone	EN 50012	EN 50012	EN 50012
• for safety of CSA	-	-	-
• For emitted interference	EN 61000-6-4 (Class A)	EN 61000-6-4 (Class A)	EN 61000-6-4 (Class A)
• For noise immunity	EN 61000-6-2 (Class A)	EN 61000-6-2 (Class A)	EN 61000-6-2 (Class A)
Directive			
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-3	EN 61000-6-2, EN 61000-6-3
• CE label	Yes	Yes	Yes
Marine classification association			
• American Bureau of Shipping Europe Ltd. (ABS)	-	-	-
• Bureau Veritas (BV)	-	-	-
• Det Norske Veritas (DNV)	-	-	-
• Germanischer Lloyd (GL)	-	-	-
• Lloyds Register of Shipping (LRS)	-	-	-
• Nippon Kaiji Kyokai (NK)	-	-	-

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-100 unmanaged

Ordering data	Order No.	Order No.
Industrial Ethernet switches SCALANCE X-100 <p>Industrial Ethernet switches for 10/100 Mbit/s, incl. operating instructions, Industrial Ethernet network manual and configuration software on CD-ROM</p> <ul style="list-style-type: none"> • SCALANCE X104-2 with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports for constructing line topologies • SCALANCE X106-1 with six 10/100 Mbit/s RJ45 ports and one fiber-optic port for constructing star topologies • SCALANCE X112-2 with twelve 10/100 Mbit/s RJ45 ports and two fiber-optic ports for constructing star topologies • SCALANCE X108 with eight 10/100 Mbit/s RJ45 ports for constructing star and line topologies • SCALANCE X116 with sixteen 10/100 Mbit/s RJ45 ports for constructing star and line topologies • SCALANCE X124 with twenty-four 10/100 Mbit/s RJ45 ports for constructing star and line topologies 	<p>6GK5 104-2BB00-2AA3</p> <p>6GK5106-1BB00-2AA3</p> <p>6GK5 112-2BB00-2AA3</p> <p>6GK5 108-0BA00-2AA3</p> <p>6GK5 116-0BA00-2AA3</p> <p>6GK5 124-0BA00-2AA3</p>	<p>Accessories</p> <p>IE FC RJ45 Plug 180</p> <p>RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface</p> <ul style="list-style-type: none"> • 1 pack = 1 unit • 1 pack = 10 units • 1 pack = 50 units <p>6GK1 901-1BB10-2AA0</p> <p>6GK1 901-1BB10-2AB0</p> <p>6GK1 901-1BB10-2AE0</p>

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

Overview



- The managed Industrial Ethernet switches of the SCALANCE X-200 product line are optimized for installing Industrial Ethernet networks with 10/100 Mbit/s in a line, star and ring topology
- Integrated redundancy manager for constructing Fast Ethernet ring topologies with high-speed media redundancy (excluding SCALANCE X208 PRO)
- Electrical or optical connection to stations or network in accordance with the port type of the devices
- High-speed media redundancy through integral redundancy manager for Fast Ethernet (SCALANCE X-300 switches in the ring in combination with SCALANCE X-200 switches or OSM/ESM)
- Rugged metal housing in S7-300 format for mounting on standard rail, S7-300 standard mounting rail or for direct wall mounting in various positions
- Rugged, industry-standard station connections with PROFINET-compatible RJ45 connectors that offer additional strain relief and bending strain relief thanks to latching on the housing
- Redundant power supply
- Diagnostics on the device by means of LEDs (power, link status, data communication)
- Error signaling contact with easy adjustment using the SET button
- The devices feature PROFINET diagnostics, SNMP access, integral web server and automatic e-mail sending function for remote diagnosis and signaling over the network.

Benefits



- Ideal solution for configuring Industrial Ethernet line, star and ring topologies
- Reliable data communication thanks to rugged device connection using PROFINET-compatible plug-in cables that offer additional strain relief and bending strain relief thanks to latching on the housing.
- High network availability through design of redundant ring structures (Redundancy Manager integrated, except for SCALANCE X208PRO)
- Fast and easy diagnosis with LEDs on the device, through the integral Web server and through signaling contacts
- Integration of the SCALANCE X-200 switches in the existing network management infrastructure through SNMP access point
- Easy integration in the process diagnosis and system diagnosis with PROFINET
- Configuration and diagnostics integrated into STEP 7 provide significant benefits during the engineering, start-up and operating phases of a plant
- Uncrossed connecting cables can be used due to the integrated Autocrossover function
- Low-maintenance operation thanks to fanless construction
- Module replacement without the need for a programming device, using the C-PLUG swap media for backing up the configuration data
- Arrangement possible without control cabinet since devices with high degree of protection IP65

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

Application

The SCALANCE X-200 Industrial Ethernet switches permit cost-effective configuration of Industrial Ethernet line, star or ring topologies with switching functionality for networks in which high availability or remote diagnostics options are required. The devices with degree of protection IP30 have been designed for use in the control cabinet. The SCALANCE X208PRO, is designed to degree of protection IP65 for installation outside the control cabinet.

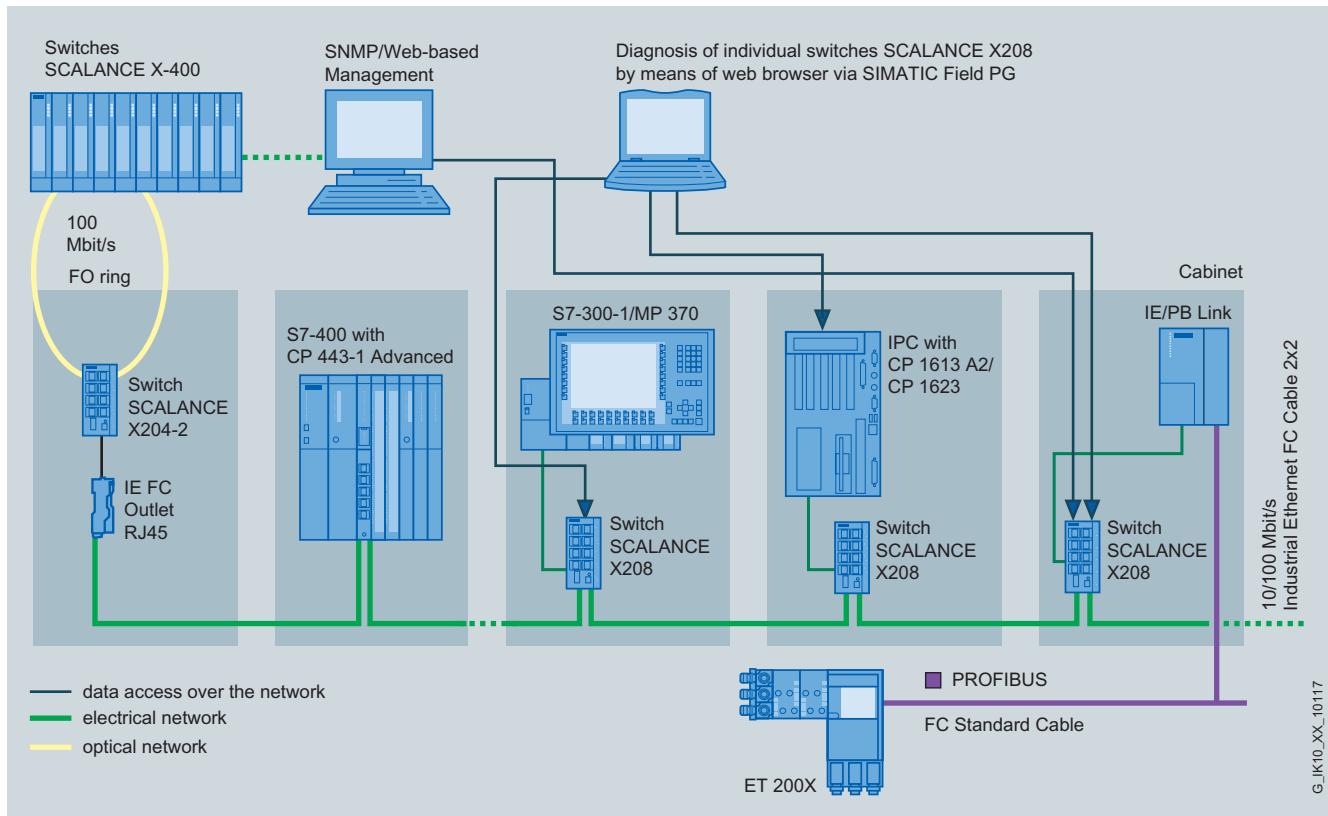
Product versions

- Switches with electrical and optical ports for glass multimode FOC up to 3 km:
 - *SCALANCE X204-2*; for setting up optical line or ring topologies with 4 electrical ports and 2 optical ports
 - *SCALANCE X206-1*; for setting up star topologies with 6 electrical ports and 1 optical port, line or ring topologies with electrical and optical transmission paths
 - *SCALANCE X212-2*; for constructing optical line or ring topologies with 12 electrical ports and 2 optical ports
- Switches with electrical and optical ports for glass single mode FOC up to 26 km:
 - *SCALANCE X204-2LD*; for constructing optical line or ring topologies with 4 electrical ports and 2 optical ports
 - *SCALANCE X206-1LD*; for constructing star topologies with 6 electrical ports and 1 optical port, line or ring topologies with electrical and optical transmission paths
 - *SCALANCE X212-2LD*; for constructing optical line or ring topologies with 12 electrical ports and 2 optical ports

- Switches with electrical ports for configuring electrical Industrial Ethernet line, star or ring topologies:
 - *SCALANCE X208*; with 8 electrical ports for mounting in the control cabinet
 - *SCALANCE X208PRO (degree of protection IP65)*; with 8 electrical ports especially for use outside the control cabinet (M12 connection system)
 - *SCALANCE X216*; with 16 electrical ports for mounting in the control cabinet
 - *SCALANCE X224*; with 24 electrical ports for mounting in the control cabinet

Features:

- Device diagnostics with LEDs (power, link status, data communication)
- Remote diagnosis is possible through signaling contact (signal mask can be set locally using buttons except with SCALANCE X208PRO), PROFINET, SNMP and web browser
- The RJ45 sockets are industry-standard and feature additional retaining collars (except for SCALANCE X208PRO), for connection to the IE FC RJ45 Plug 180
- The eight PROFINET-compatible M12 sockets of the SCALANCE X208PRO are designed with degree of protection IP65 for connection to the IE M12 Plug PRO or the pre-assembled IE M12 connecting cable
- The SCALANCE X208PRO can be mounted on a DIN rail or S7-300 rail or direct on the equipment or machine in a space-saving, horizontal or vertical design; the status information can be read off regardless of the mounting position thanks to the angled LED strip.
- Power can also be supplied to the SCALANCE X208PRO from outside the control cabinet from the PS791-1PRO power supply module at 230 V AC.



Diagnostics access over SNMP and Web browser with SCALANCE X208

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

Design

The SCALANCE X-200 Industrial Ethernet switches with a rugged metal housing are optimized for mounting on a standard rail and an S7-300 rail. Direct wall mounting in various positions is also possible. With the S7-300 housing format, the devices are optimized for integration in an automation solution with S7-300 components.

The switches with degree of protection IP30 feature:

- A 4-pole terminal block for connecting the redundant supply voltage (2 x 24 V DC)
- A row of LEDs to indicate the status information (power, link status, data exchange, power supply, signaling contact)
- A 2-pole terminal block for connecting the isolated signaling contact
- A SET button for on-site configuration of the signaling contact

The SCALANCE X208PRO with degree of protection IP65 features:

- 2 x M12 interfaces for connecting the redundant supply voltage (2 x 24 V DC)
- A row of LEDs to indicate the status information (power, link status, data exchange, power supply, signaling contact, redundancy manager function (excluding SCALANCE X208 PRO))
- An M12 interface for connecting the isolated signaling contact

The SCALANCE X-200 switches are available with the following port types:

- *10/100BaseTX, RJ45 or M12 connection*;
RJ45 or M12 socket, automatic detection of the data rate (10 or 100 Mbit/s), with Autosensing and Autocrossover functions for connecting IE FC cables using IE FC RJ45 Plug 180 or IE M12 Plug PRO up to 100 m.
- *100BaseFX, BFOC connection technique*;
BFOC sockets for direct connection to Industrial Ethernet glass fiber-optic cables up to 3 km (multimode FOC) or up to 26 km (single mode FOC) for configuring line, ring and star topologies.

Function

- Configuring electrical and optical Industrial Ethernet line, star and ring topologies
- Fast redundancy in the ring with High Speed Redundancy (HSR); up to 0.3 seconds for reconfiguration of the ring with 50 switches in the ring
- The functioning of the ring is continuously monitored by the integrated redundancy manager (with the exception of SCALANCE X208 PRO). It recognizes failure of a transmission path in the ring or failure of a SCALANCE X-200 and activates the substitute path within 0.3 seconds
- Use in ring topologies (100 Mbit/s) together with SCALANCE X-400, SCALANCE X-300, SCALANCE X-200IRT or OSM
- Uncrossed connecting cables can be used due to Autocrossover function integrated in the ports
- Load disconnection through integral switch functionality
- Easy diagnostics using signaling contact, SNMP and Web browser
- Easy copper cable diagnostics with Web browser for localizing cable breaks
- Integration into the diagnostics of a PROFINET IO controller with expanded diagnostics functions for a consistent diagnostics concept, including network infrastructure
- Diagnosis of data traffic by means of a parameterizable mirror port with a standard commercial network analyzer
- Optimized support of PROFINET real-time communication (RT) through prioritizing
- Fast device replacement in the event of a fault by using the optional C-PLUG swap medium (not included in scope of supply)

Network topology and network configuration

The Industrial Ethernet SCALANCE X-200 switches with degree of protection IP30 are usually installed in a control cabinet together with the stations to be connected. Electrical and optical versions can be installed together in star, line and ring topologies. The SCALANCE X208PRO is designed for installation outside the control cabinet.

When configuring the network, it is necessary to observe the following boundary conditions:

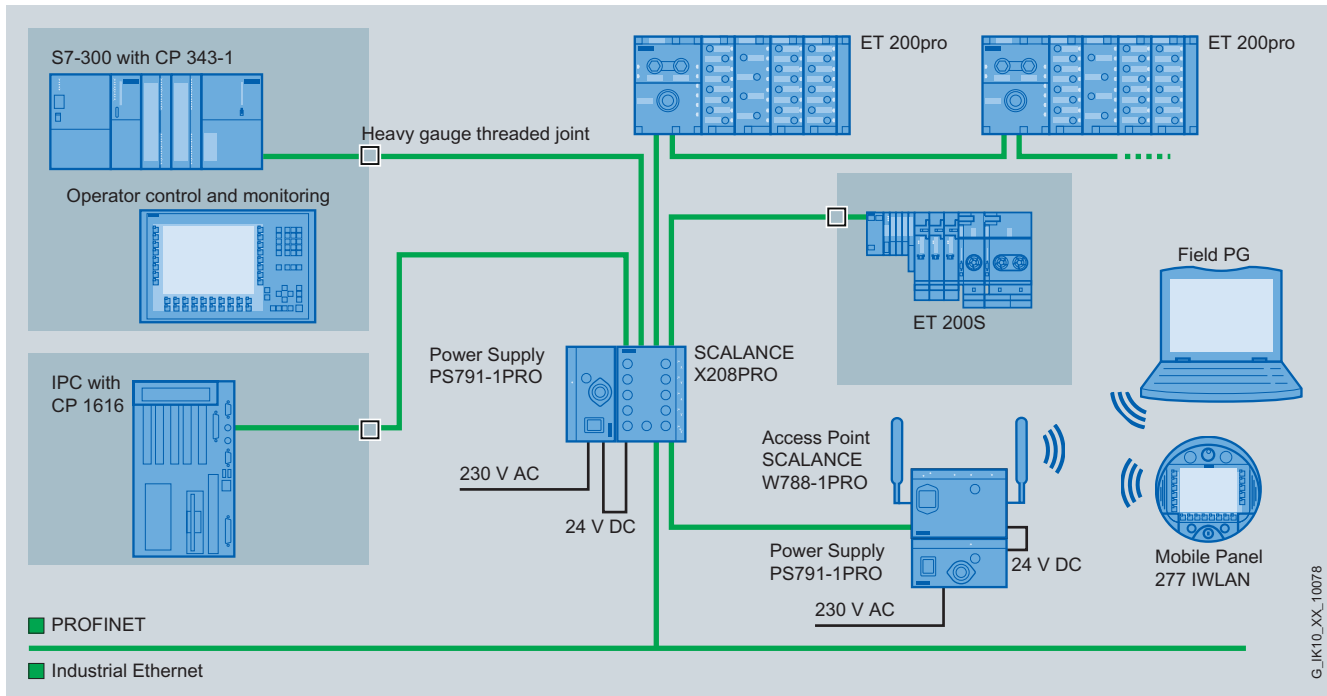
- Length of the TP cable between two SCALANCE X switches:
 - Max. 100 m with IE FC cable and IE FC RJ45 Plug 180 or IE FC M12 Plug PRO
 - Max. 10 m using patches with TP cord
- Length of the optical cables
 - Max. 3000 m with Industrial Ethernet glass fiber optic cables (multimode).
 - Max. 26000 m with Industrial Ethernet glass fiber optic cables (single mode).
- IP Address:
The IP address is assigned by means of the DHCP (Dynamic Host Configuration Protocol). If there is no corresponding server in the network, the IP address can be assigned using the supplied software tool PST (Primary Setup Tool) or STEP 7. The SCALANCE X-200IRT switches and their real-time functions are configured with STEP 7.

PROFINET/Industrial Ethernet

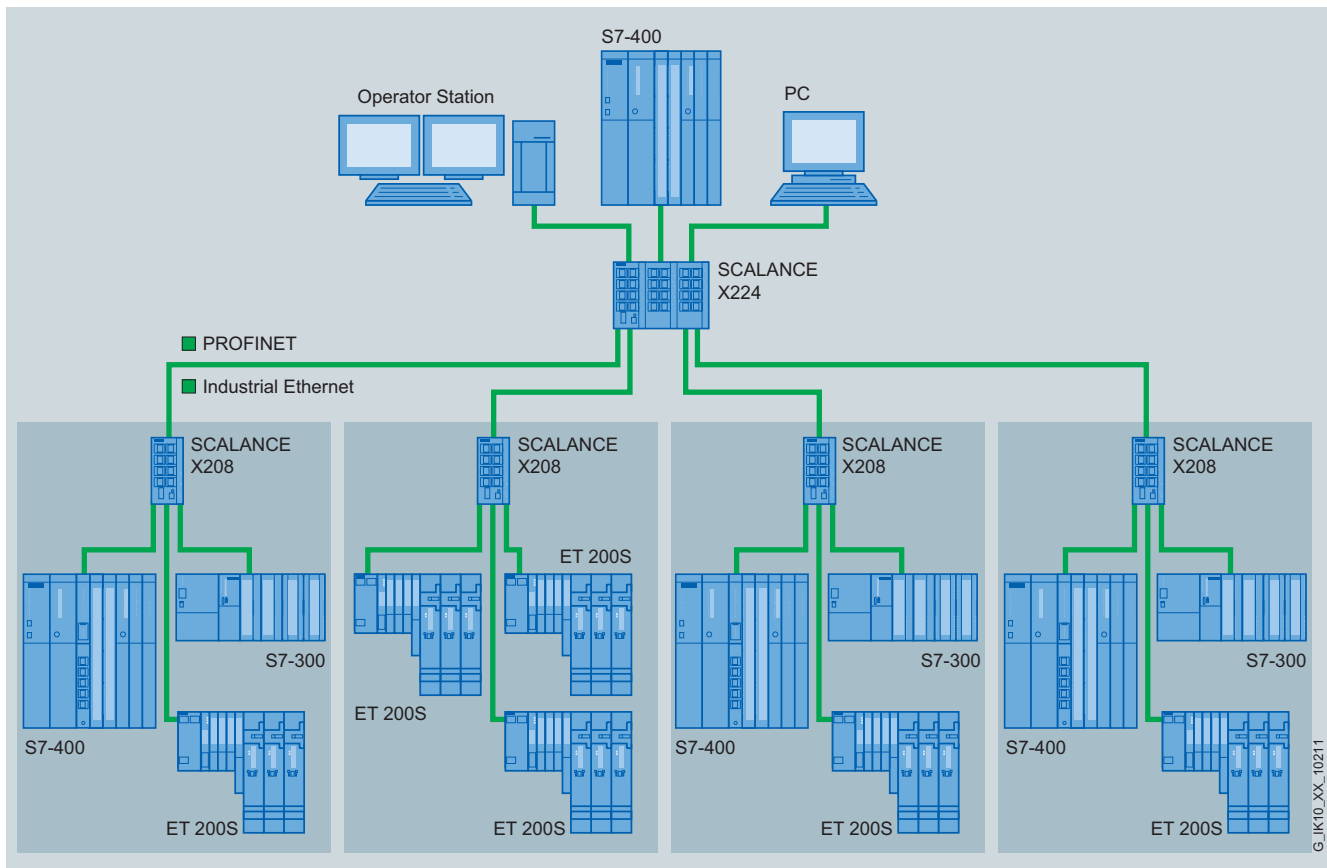
Industrial Ethernet Switches

SCALANCE X-200 managed

Function (continued)



Star network topology with SCALANCE X208PRO outside the control cabinet and 230 V AC power supply



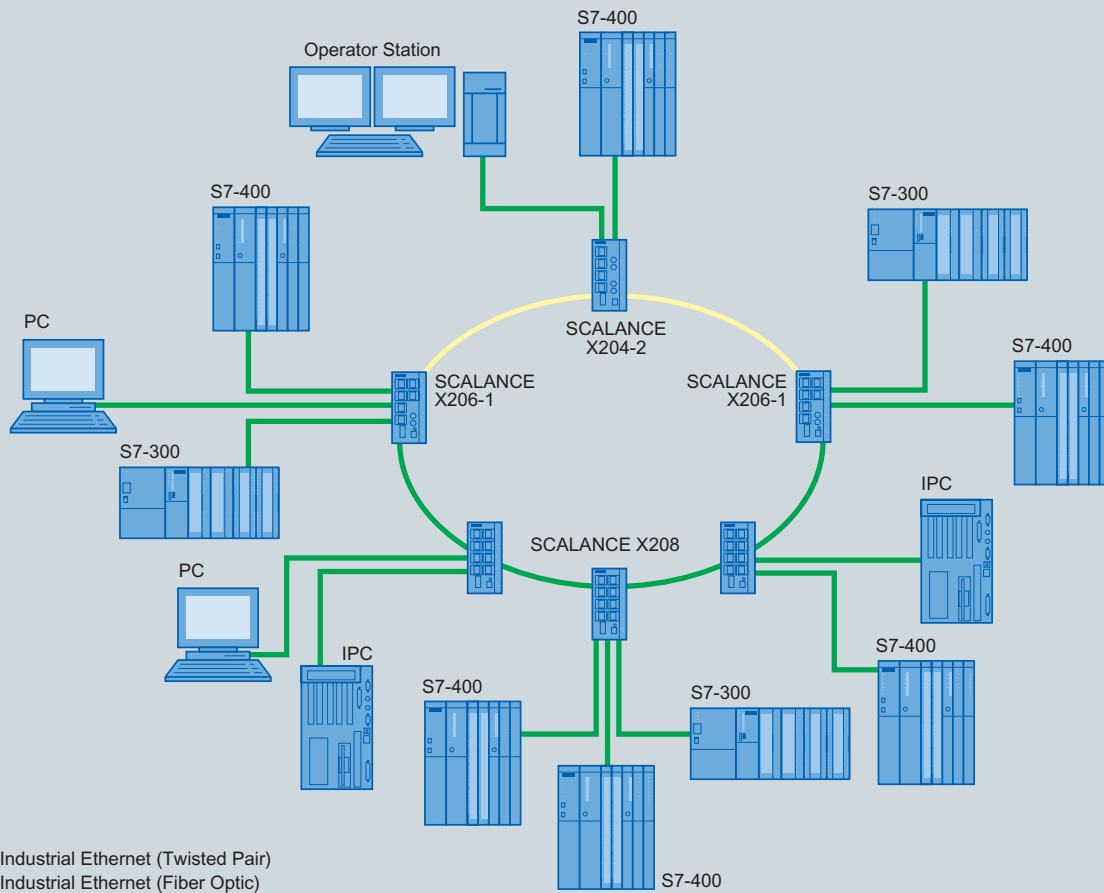
Star topology with SCALANCE X224

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

Function (continued)



G_K10_XX_10113

High-speed redundancy in mixed ring with fiber-optic and twisted-pair cables

Commissioning and diagnosis

PROFINET diagnostics alarms from SCALANCE X can be displayed with the appropriate SIMATIC Engineering Tools and processed in the controller with expanded diagnostics functions. The engineering outlay for the PLC and HMI have been drastically reduced through complete integration in the SIMATIC concept for system error messages.

The SCALANCE X-200 Industrial Ethernet switches can also be integrated into a network management system through the standardized protocol SNMP (Simple Network Management Protocol). In the event of a fault in the device, error messages (SNMP traps) can be sent to a network system or as e-mail to a specified network manager.

The integral Web server enables configuration and diagnostics settings to be made using a standard browser (e.g. port configuration). Statistical information can also be read out over the Web server (e.g. port capacity utilization).

PROFINET IO diagnostic alarms of SCALANCE X-200 switches can be displayed using the relevant SIMATIC Engineering Tools or also processed in the PLC. The engineering outlay is drastically reduced for the PLC and HMI through complete integration into the SIMATIC SFM system error signaling concept.

The following information is displayed on site by LEDs:

- Power
- Port status
- Data traffic
- Signaling contact
- Redundancy manager function (excluding SCALANCE X208 PRO)

The Industrial Ethernet switches of the SCALANCE X-200 line can also be monitored using the floating signaling contact.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

Technical specifications

Order No.	6GK5 204-2BB10-2AA3	6GK5 204-2BC10-2AA3	6GK5 206-1BB10-2AA3	6GK5 206-1BC10-2AA3
Product type description	SCALANCE X204-2	SCALANCE X204-2LD	SCALANCE X206-1	SCALANCE X206-1LD
Transfer rate				
• Transfer rate 1	10 Mbit/s	10 Mbit/s	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s	100 Mbit/s	100 Mbit/s
Number of electrical connections				
• for signaling contact	1	1	1	1
• for network components or terminals	4	4	6	6
• for redundant voltage supply	1	1	1	1
• for voltage supply	1	1	1	1
Electrical connection version				
• for signaling contact	2-pin terminal block	2-pin terminal block	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 (10/100 Mbit/s; TP)	RJ45 (10/100 Mbit/s; TP)	RJ45 (10/100 Mbit/s; TP)	RJ45 (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables				
• at 10 Mbit/s	-	-	-	-
• at 100 Mbit/s	2	2	1	1
Version of optical port for fiber-optic cables				
• at 10 Mbit/s	-	-	-	-
• at 100 Mbit/s	BFOC sockets (100 Mbit/s)	BFOC sockets (100 Mbit/s)	BFOC sockets (100 Mbit/s)	BFOC sockets (100 Mbit/s)
Version of the C-PLUG swap medium	Yes	Yes	Yes	Yes
Type of supply voltage	DC	DC	DC	DC
Supply voltage	24 V	24 V	24 V	24 V
• external	24 V	24 V	24 V	24 V
- Maximum	32 V	32 V	32 V	32 V
- Minimum	18 V	18 V	18 V	18 V
Current consumed	215 mA	215 mA	200 mA	200 mA
Effective power loss				
• at 24 V DC	5.16 W	5.16 W	4.8 W	4.8 W
Ambient temperature				
• during operation	-10 ... +60 °C	0 ... +60 °C	-10 ... +60 °C	0 ... +60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%	95%	95%
Width	60 mm	60 mm	60 mm	60 mm
Height	125 mm	125 mm	125 mm	125 mm
Depth	124 mm	124 mm	124 mm	124 mm
Net weight	780 g	780 g	780 g	780 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30	IP30	IP30

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

Technical specifications (continued)

Order No.	6GK5 204-2BB10-2AA3	6GK5 204-2BC10-2AA3	6GK5 206-1BB10-2AA3	6GK5 206-1BC10-2AA3
Product type description	SCALANCE X204-2	SCALANCE X204-2LD	SCALANCE X206-1	SCALANCE X206-1LD
Standard				
• for EMI of FM	FM 3611	FM 3611	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021	EN 50021	EN 50021
• for safety of CSA	-	-	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Directive				
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes	Yes	Yes
Marine classification association				
• American Bureau of Shipping Europe Ltd.(ABS)	Yes	Yes	Yes	Yes
• Bureau Veritas (BV)	Yes	Yes	Yes	Yes
• Det Norske Veritas (DNV)	Yes	Yes	Yes	Yes
• Germanischer Lloyd (GL)	Yes	Yes	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes	Yes	Yes
• Nippon Kaiji Kyokai (NK)	Yes	Yes	Yes	Yes

Order No.	6GK5 212-2BB00-2AA3	6GK5 212-2BC00-2AA3
Product type description	SCALANCE X212-2	SCALANCE X212-2LD
Transfer rate		
• Transfer rate 1	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s
Number of electrical connections		
• for signaling contact	1	1
• for network components or terminals	12	12
• for redundant voltage supply	1	1
• for voltage supply	1	1
Electrical connection version		
• for signaling contact	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 (10/100 Mbit/s; TP)	RJ45 (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	2	2
Version of optical port for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	BFOC sockets (100 Mbit/s)	BFOC sockets (100 Mbit/s)
Version of the C-PLUG swap medium	Yes	Yes

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

2

Technical specifications (continued)

Order No.	6GK5 212-2BB00-2AA3	6GK5 212-2BC00-2AA3
Product type description	SCALANCE X212-2	SCALANCE X212-2LD
Type of supply voltage	DC	DC
Supply voltage	24 V	24 V
• external	24 V	24 V
- Maximum	32 V	32 V
- Minimum	18 V	18 V
Current consumed	330 mA	330 mA
Effective power loss		
• at 24 V DC	7.92 W	7.92 W
Ambient temperature		
• during operation	0 ... +60 °C	0 ... +60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%
Width	120 mm	120 mm
Height	125 mm	125 mm
Depth	124 mm	124 mm
Net weight	1200 g	1200 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30
Standard		
• for EMI of FM	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021
• for safety of CSA	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2
Directive		
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes
Marine classification association		
• American Bureau of Shipping Europe Ltd.(ABS)	-	-
• Bureau Veritas (BV)	Yes	Yes
• Det Norske Veritas (DNV)	Yes	Yes
• Germanischer Lloyd (GL)	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes
• Nippon Kaiji Kyokai (NK)	Yes	Yes

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

Technical specifications (continued)

Order No.	6GK5 208-0BA10-2AA3	6GK5 208-0HA00-2AA6	6GK5 216-0BA00-2AA3	6GK5 224-0BA00-2AA3
Product type description	SCALANCE X208	SCALANCE X208PRO	SCALANCE X216	SCALANCE X224
Transfer rate				
• Transfer rate 1	10 Mbit/s	10 Mbit/s	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s	100 Mbit/s	100 Mbit/s
Number of electrical connections				
• for signaling contact	1	1	1	1
• for network components or terminals	8	8	16	24
• for redundant voltage supply	1	1	1	1
• for voltage supply	1	1	1	1
Electrical connection version				
• for signaling contact	2-pin terminal block	5-pin M12 interface	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 (10/100 Mbit/s; TP)	4-pole M12 sockets (10/100 Mbit/s; D-coded)	RJ45 (10/100 Mbit/s; TP)	RJ45 (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin M12 interface	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables				
• at 10 Mbit/s	-	-	-	-
• at 100 Mbit/s	-	-	-	-
Version of optical port for fiber-optic cables				
• at 10 Mbit/s	-	-	-	-
• at 100 Mbit/s	-	-	-	-
Version of the C-PLUG swap medium	Yes	Yes	Yes	Yes
Type of supply voltage	DC	DC	DC	DC
Supply voltage	24 V	24 V	24 V	24 V
• external	24 V	24 V	24 V	24 V
- Maximum	32 V	32 V	32 V	32 V
- Minimum	18 V	18 V	18 V	18 V
Current consumed	185 mA	185 mA	240 mA	350 mA
Effective power loss				
• at 24 V DC	4.0 W	4.0 W	5.76 W	8.4 W
Ambient temperature				
• during operation	-20 °C ... + 70 °C	-20 ... +70 °C	0 °C ... + 60 °C	0 °C ... + 60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	100%	95%	95%
Width	60 mm	90 mm	120 mm	180 mm
Height	125 mm	125 mm	125 mm	125 mm
Depth	124 mm	124 mm	124 mm	124 mm
Net weight	780 g	1000 g	1200 g	1600 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP65	IP30	IP30

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

Technical specifications (continued)

Order No.	6GK5 208-0BA10-2AA3	6GK5 208-0HA00-2AA6	6GK5 216-0BA00-2AA3	6GK5 224-0BA00-2AA3
Product type description	SCALANCE X208	SCALANCE X208PRO	SCALANCE X216	SCALANCE X224
Standard				
• for EMI of FM	FM 3611	FM 3611	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021	EN 50021	EN 50021
• for safety of CSA	-	-	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Directive				
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes	Yes	Yes
Marine classification association				
• American Bureau of Shipping Europe Ltd.(ABS)	Yes	Yes	Yes	Yes
• Bureau Veritas (BV)	Yes	Yes	Yes	Yes
• Det Norske Veritas (DNV)	Yes	Yes	Yes	Yes
• Germanischer Lloyd (GL)	Yes	Yes	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes	Yes	Yes
• Nippon Kaiji Kyokai (NK)	Yes	Yes	Yes	Yes

Ordering data

Industrial Ethernet Switches SCALANCE X-200

Industrial Ethernet switches with integral SNMP access, online diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; with integrated redundancy manager (exception: SCALANCE X208PRO); incl. operating instructions, Industrial Ethernet network manual and configuration software on CD-ROM

- With electrical and optical ports for glass multimode FOC up to max. 3 km

- **SCALANCE X204-2**
with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports
- **SCALANCE X206-1**;
with six 10/100 Mbit/s RJ45 ports and one fiber-optic port
- **SCALANCE X212-2**
with 12 10/100 Mbit/s RJ45 ports and two fiber-optic ports

6GK5 204-2BB10-2AA3

6GK5 206-1BB10-2AA3

6GK5 212-2BB00-2AA3

- With electrical and optical ports for glass single mode FOC up to max. 26 km

- **SCALANCE X204-2LD**
with four 10/100 Mbit/s RJ45 ports and two long-distance fiber-optic ports

- **SCALANCE X206-1LD**;
with six 10/100 Mbit/s RJ45 ports and one long-distance fiber-optic port

- **SCALANCE X212-2LD**
with twelve 10/100 Mbit/s RJ45 ports and two long-distance fiber-optic ports

- With electrical ports

- **SCALANCE X208**;
with eight 10/100 Mbit/s RJ45 ports

- **SCALANCE X208PRO**
with eight 10/100 Mbit/s M12 ports, incl. eleven M12 dust protection caps, degree of protection IP65

- **SCALANCE X216**
with sixteen 10/100 Mbit/s RJ45 ports

- **SCALANCE X224**
with twenty-four 10/100 Mbit/s RJ45 ports

Order No.

6GK5 204-2BC10-2AA3

6GK5 206-1BC10-2AA3

6GK5 212-2BC00-2AA3

6GK5 208-0BA10-2AA3

6GK5 208-0HA00-2AA6

6GK5 216-0BA00-2AA3

6GK5 224-0BA00-2AA3

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200 managed

2

Ordering data

Order No.

Accessories

IE FC RJ45 Plug 180

RJ45 plug-in connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

IE M12 Plug PRO

M12 plug connector for connection of Industrial Ethernet FC installation cables; 4-pole, D-coded, metal enclosure, degree of protection IP65, pin insert; 180° cable outlet; for network components and Industrial Ethernet stations with degree of protection IP65/IP67

- 1 pack = 1 unit
- 1 pack = 8 units

6GK1 901-0DB20-6AA0

6GK1 901-0DB20-6AA8

IE Connecting Cable M12-180/M12-180

Pre-assembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with two 4-pole M12 plugs, 4-pole, D-coded, degree of protection IP65/IP67; Length:

- 0.3 m
- 0.5 m
- 1.0 m
- 1.5 m
- 2.0 m
- 3.0 m
- 5.0 m
- 10 m
- 15 m

6XV1 870-8AE30

6XV1 870-8AE50

6XV1 870-8AH10

6XV1 870-8AH15

6XV1 870-8AH20

6XV1 870-8AH30

6XV1 870-8AH50

6XV1 870-8AN10

6XV1 870-8AN15

Order No.

Accessories (continued)

IE M12 Panel Feedthrough

Control cabinet feedthrough for transition from 4-pole, D-coded M12 interface (IP65/IP67) to RJ45 socket (IP20)

- 1 pack = 5 units

6GK1 901-0DM20-2AA5

IE Power M12 Cable Connector PRO

Socket for connecting SCALANCE W-700/SCALANCE X208PRO for 24 V DC supply; 4-pole, A-coded, with installation instructions

6GK1 907-0DC10-6AA3

Signaling Contact M12 Cable Connector PRO

Socket for connecting SCALANCE X208PRO for signaling contact; 5-pole, B-coded, with installation instructions

6GK1 908-0DC10-6AA3

PS791-1PRO Power Supply

AC/DC power supply, 10 W, IP65 (-20 ... +60°C), Input: 85 ... 265 V AC, output: 24 V DC, metal housing, Scope of supply: AC power 3+PE cable connector, DC power cord M12, installation materials, manuals German/English

6GK5 791-1PS00-0AA6

C-PLUG

Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot

6GK1 900-0AB00

SIMATIC NET Manual Collection

Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English

6GK1 975-1AA00-3AA0

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

Overview



- Especially designed for constructing isochronous real-time (IRT) Industrial Ethernet in line, star and ring topologies with 10/100 Mbit/s (Redundancy Manager integrated); construction of redundant ring connections possible
- Combination of the switching mechanisms "Cut Through" and "Store and Forward" for optimized performance
- Electrical or optical connection to stations or network in accordance with the port type of the devices
- High-speed media redundancy through integral redundancy manager for Fast Ethernet (SCALANCE X-300 switches in the ring in combination with SCALANCE X-200 switches or OSM/ESM)
- Rugged metal enclosure with same dimensions as S7-300 for space-saving cabinet mounting on standard rails, S7-300 DIN rail or for wall mounting
- Rugged, industry-standard station connections with PROFINET-compatible plug-in connectors that offer additional strain relief and bending strain relief thanks to latching on the housing
- Redundant power supply
- Can be used for fault-tolerant applications and can be replaced during normal operation thanks to redundant transmission characteristics
- Diagnostics on the device by means of LEDs (power, link status, data communication)
- Error signaling contact with easy adjustment using the SET button
- The devices feature PROFINET diagnostics, SNMP access, integral Web server and automatic e-mail sending function for remote diagnosis and signaling over the network
- Different device versions with copper and fiber-optic interfaces (BFOC, SC RJ)
- Device variants with degree of protection IP65/67 for cabinet-free plant concepts with PROFINET-compliant push pull connection systems

Benefits



- The ideal solution for constructing isochronous real-time (IRT) Industrial Ethernet segments especially in line, star and ring topologies with copper and fiber-optic cabling (glass FOC, PCF FOC, POF FOC)
- Reliable data communication thanks to industry-standard device connection using PROFINET-compatible plug-in connectors (IE FC RJ45 Plug) that offer additional strain relief and bending strain relief due to latching on the housing
- High network availability through design of redundant ring structures (RM integrated)
- Fast and easy diagnosis with LEDs on the device, through the integral Web server and through signaling contacts
- Integration of the SCALANCE X-200IRT switches in the existing network management infrastructure through SNMP access point
- Easy integration in the process diagnosis and system diagnosis with PROFINET
- Configuration and diagnostics integrated into STEP 7 provide significant benefits during the engineering, start-up and operating phases of a plant
- Uncrossed connecting cables can be used due to the integrated Autocrossover function
- Low-maintenance operation thanks to fanless construction
- Module replacement without the need for a programming device, using the C-PLUG swap media for backing up the configuration data
- Device variants with various degrees of protection (IP classes) for both cabinet and cabinet-free mounting

2

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

Application

The SCALANCE X-200IRT Industrial Ethernet switches permit the construction of isochronous real-time (IRT) Industrial Ethernet line and star topologies. Ring structures can also be designed using the integral redundancy manager (RM). Redundant ring connections are also possible. Thanks to innovative switching technology, the special requirements of automation with regard to line topology, isochronous mode for motion control applications and unlimited IT openness have been satisfied for the first time within a single technology based on the PROFINET standard.

The switches with degree of protection IP30 have been designed for use in the control cabinet. The switches with degree of protection IP65/67 are designed for cabinet-free mounting (PROFINET-compliant push pull connection technology).

Product versions

SCALANCE X204IRT

- For configuring electrical Industrial Ethernet line, star or ring topologies with 4 electrical ports

SCALANCE X202-2IRT

- For configuring electrical or optical Industrial Ethernet line, star or ring topologies with 2 electrical ports and 2 glass fiber optic ports

SCALANCE X202-2P IRT

- For configuring electrical or optical Industrial Ethernet line, star or ring topologies with 2 electrical ports and 2 plastic fiber optic ports

SCALANCE X201-3P IRT

- For configuring electrical or optical Industrial Ethernet line, star or ring topologies with 1 electrical port and 3 plastic fiber optic ports

SCALANCE X200-4P IRT

- For configuring optical Industrial Ethernet line, star or ring topologies with 4 optical POF FOC ports

SCALANCE X204 IRT PRO

- For the construction of electrical Industrial Ethernet linear, point-to-point or ring structures with four electrical ports with degree of protection IP65/67 and PROFINET-compliant push-pull connection technology

SCALANCE X202-2P IRT PRO

- For the construction of electrical or optical Industrial Ethernet linear, point-to-point or ring structures with two electrical and two optical POF/PCF fiber optic ports with degree of protection IP65/67 and PROFINET-compliant push-pull connection technology

Applicable to all versions:

- Integral redundancy manager (RM)
- Device diagnostics with LEDs (power, link status, data communication)
- Remote diagnosis is possible through signaling contact (signal mask can be set locally using buttons), PROFINET, SNMP and Web browser
- Automatic e-mail send function
- Rugged, industry-standard station connections with PROFINET-compatible RJ45 connectors that offer additional strain relief and bending strain relief thanks to latching on the housing

The SCALANCE X-200IRT switches, based on PROFINET, satisfy the real-time requirements of the field level up to high-performance motion control applications.

Real-time Ethernet

- Interfacing of the PROFINET IO-Devices to the PROFINET IO-Controller through high-performance, optimized data transmission
- Coexistence of isochronous mode for motion control applications and IT openness: Reaction-free transmission of real-time and non-real-time communication on the same line
- Increased availability thanks to redundant transmission with bumpless changeover for real-time data

Additionally through isochronous real-time (IRT) Ethernet

- Isochronous real-time communication based on the transmission procedure of the IEEE 802 by combining the switching mechanisms "Cut Through" and "Store and Forward".
- For drive controls, PROFINET with isochronous real-time is the best performing system worldwide with regard to its isochronous and deterministic response. With a cycle time of 1 ms, for example, axes can be controlled in isochronous mode whereby 50 % of the bandwidth is available solely for IT communication.

Design

- The SCALANCE X-200IRT switches in a rugged metal housing with degrees of protection IP30 and IP65/67 are optimized for mounting on a standard rail and an S7-300 rail. Direct wall mounting in various positions is also possible. With the S7-300 housing format, the devices are optimized for integration in an automation solution with S7-300 components. The switches have a 4-pin terminal block for connecting the redundant supply voltage (2 x 24 V DC). The versions with degree of protection IP65/67 have two 5-pin push-pull connectors via which the supply voltage is fed and forwarded. In addition, the load voltage circuit is also looped through for the ET200pro devices further along the line. The devices with degree of protection IP65/67 thus have no redundant voltage feed, but permit optimal integration into cabinet-free plant concepts with ET200pro modules. The status information (power, link status, data traffic, voltage supply, message contact) is indicated by means of a row of LEDs.

The SCALANCE X-200IRT modules are available with the following port types:

- 10/100BaseTX, RJ45 connection**
RJ45 socket, automatic detection of the data rate (10 or 100 Mbit/s), with Autosensing and Autocrossover function for connecting IE FC cables over IE FC RJ45 Plug 180 over distances up to 100 m.
- 10/100BaseTX, push-pull RJ45 connection**
RJ45 socket, automatic detection of the data rate (10 or 100 Mbit/s), with autosensing and autocrossover function for connecting IE FC cables via IE FC RJ45 Plug PRO over distances up to 100 m
- 100BaseFX, BFOC connection technique**
BFOC sockets for direct connection to Industrial Ethernet glass fiber-optic cables up to 3000 m for configuring line and star topologies.
- 100BaseFX, SC RJ connections**
SC RJ sockets for connection to Industrial Ethernet POF (50 m) and PCF FOC (100 m) using SC RJ plug connectors
- 100BaseFX, push-pull SC RJ connections**
SC RJ sockets for connection to Industrial Ethernet POF (50 m) and PCF FOC (100 m) using SC RJ plug PRO connectors

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

Function

- 4-port switch for configuring electrical and optical Industrial Ethernet line, star and ring topologies
- Integral redundancy manager for design of ring topologies
- Integral standby function for redundant coupling of two rings
- Extremely short cycle times with highly accurate clock-pulse rates thanks to integrated real-time functions
- Redundant data transmission with bumpless changeover
- System-wide clock accuracy (less than 1 ms)
- Uncrossed connecting cables can be used due to Autocross-over function integrated in the ports
- Load disconnection through integral switch functionality
- Easy diagnostics using signaling contact, SNMP and Web browser
- Automatic e-mail function
- Integration into the diagnostics of a PROFINET IO-Controllers for a consistent diagnostics concept, including network infrastructure
- Fast device replacement in the event of a fault by using the optional C-PLUG swap medium (not included in scope of supply)

Network topology and network configuration

The SCALANCE X-200IRT Industrial Ethernet Switches are usually installed in the control cabinet together with the stations to be connected (e.g. ET 200S) or, in the case of cabinet-free designs, mounted directly onto the machine. When configuring the network, it is necessary to observe the following boundary conditions:

- Length of the TP cable between two SCALANCE X switches:
 - Max. 100 m with IE FC cable and IE FC RJ45 Plug 180 or IE RJ45 Plug PRO
 - Max. 10 m with TP Cord
- Length of the optical cables
 - Max. 3000 m with Industrial Ethernet glass fiber-optic cables.
 - Max. 100 m with Industrial Ethernet PCF fiber-optic cables.
 - Max. 50 m with Industrial Ethernet POF fiber-optic cables.
- IP Address:

The IP address is assigned using the DHCP (Dynamic Host Configuration Protocol) mechanism. If there is no corresponding server in the network, the IP address can be assigned using the supplied software tool PST (Primary Setup Tool) or STEP 7. The SCALANCE X-200IRT switches and their real-time functions are configured with STEP 7.

Commissioning and diagnosis

PROFINET diagnostic alarms from SCALANCE X can be displayed with the appropriate SIMATIC Engineering Tools and processed in the control. The engineering outlay for the PLC and HMI have been drastically reduced through complete integration in the SIMATIC concept for system error messages.

The SCALANCE X-200IRT Industrial Ethernet switches can also be integrated into a network management system through the standardized protocol SNMP (Simple Network Management Protocol). In the event of a device fault, error messages (SNMP traps) can be sent to a network system or as e-mail to a specified network manager.

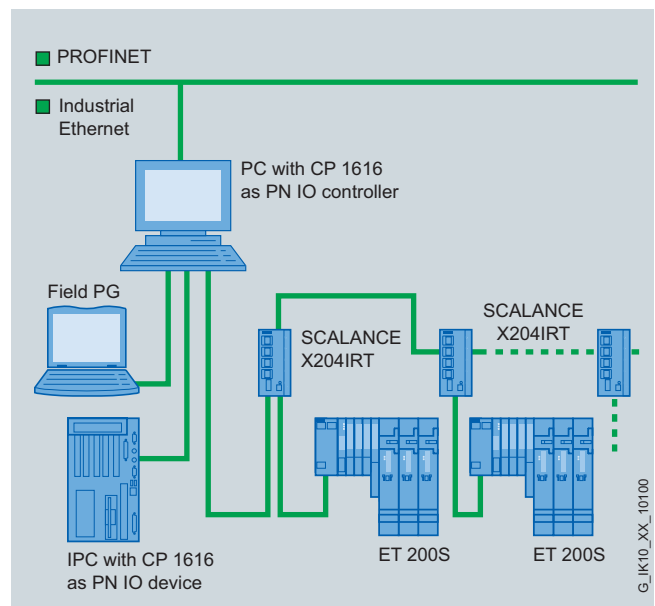
The integral Web server enables configuration and diagnosis settings to be made using a standard browser. Statistical information can also be read out over the Web server. Warning thresholds, and alarms generated by them, permit early recognition of critical fiber states (only with POF). Cable failures (fiber breakage) can thus be avoided, and plant downtimes reduced, since maintenance work can be carried out at an early point in time and outside production periods.

PROFINET IO diagnostic alarms of X-200IRT switches can be displayed using the relevant SIMATIC Engineering Tools or also processed in the PLC. The engineering outlay is drastically reduced for the PLC and HMI through complete integration into the SIMATIC SFM system error signaling concept.

The following information is displayed on site by LEDs:

- Power
- Port status
- Data traffic
- RM activated
- POF cable diagnostics

The Industrial Ethernet switches of the SCALANCE X-200IRT line can also be monitored using the floating signaling contact.



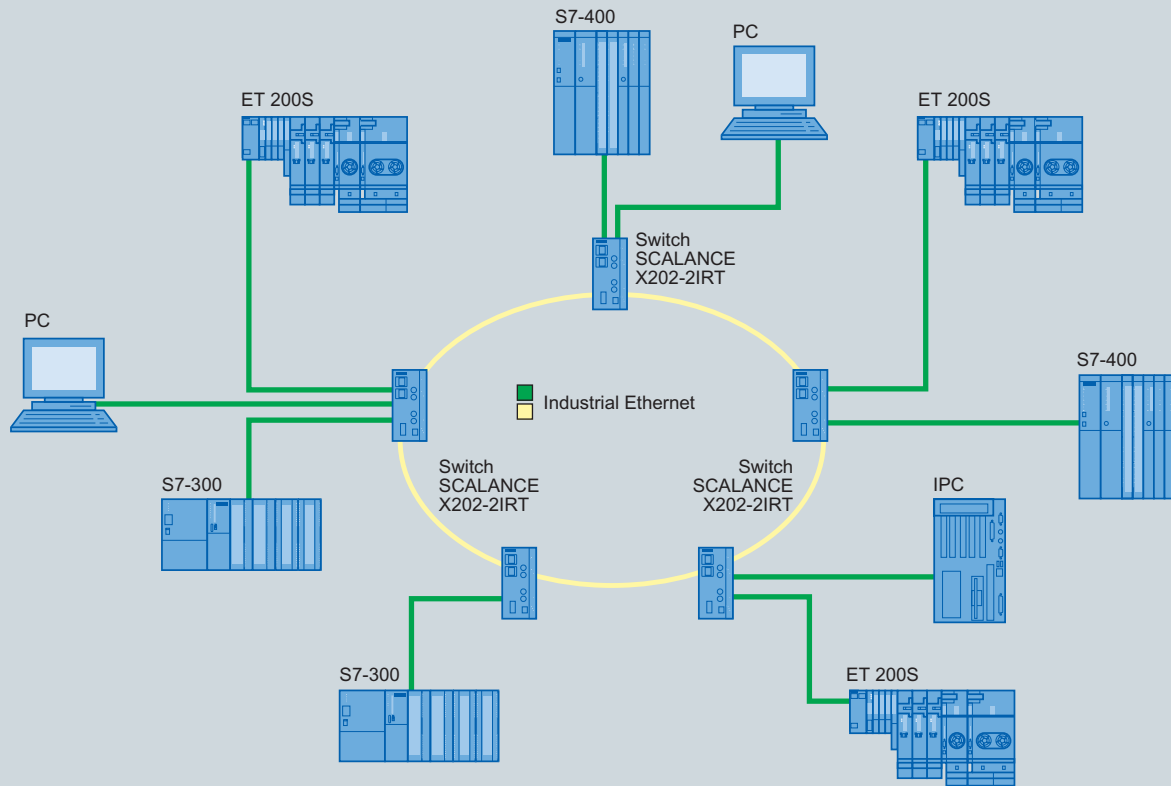
Configuration example for SCALANCE X204IRT

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

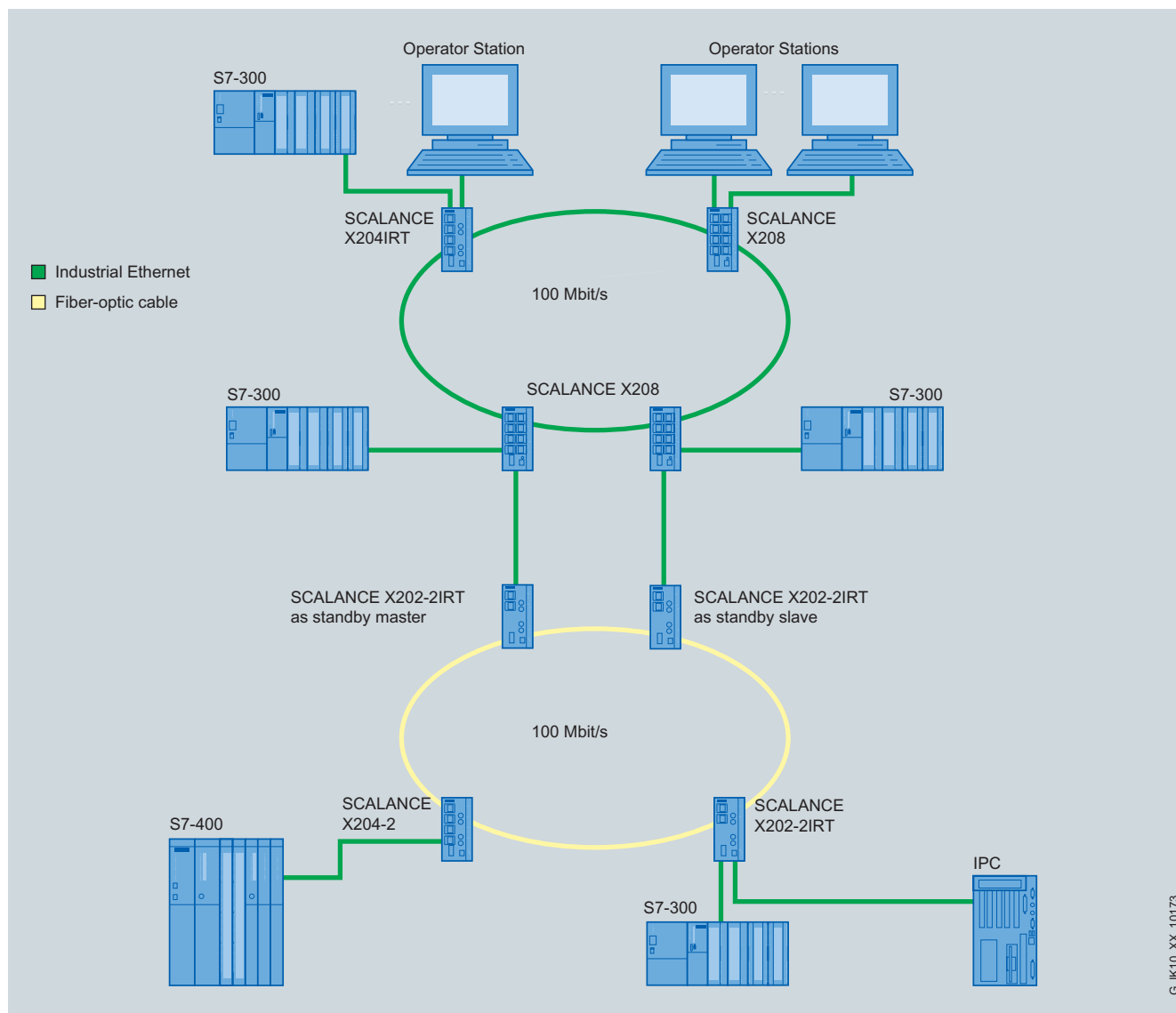
Function (continued)



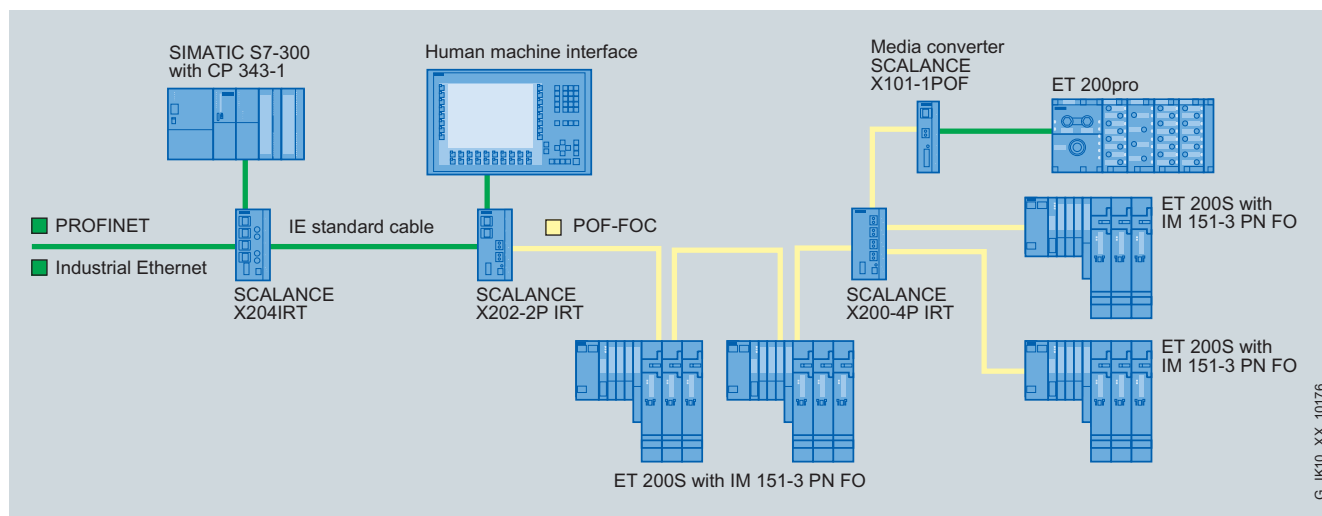
G_JK10_XX_10102

Configuration with high-speed redundancy in the optical ring

Function (continued)



Redundant coupling of two subnetworks with SCALANCE X-200IRT



Mixed network topology with plastic fiber-optic cables and twisted-pair cables

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

Technical specifications

Order No.	6GK5 204-0BA00-2BA3	6GK5 202-2BB00-2BA3
Product type description	SCALANCE X204IRT	SCALANCE X202-2IRT
Transfer rate		
• Transfer rate 1	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s
Number of electrical connections		
• for signaling contact	1	1
• for network components or terminals	4	2
• for redundant voltage supply	1	1
• for voltage supply	1	1
• for TP cables with FastConnect	-	-
Electrical connection version		
• for signaling contact	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 (10/100 Mbit/s; TP)	RJ45 (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	-	2
Version of optical port for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	-	BFOC socket (100 Mbit/s)
Version of the C-PLUG swap medium	Yes	Yes
Type of supply voltage	DC	DC
Supply voltage	24 V	24 V
• external	24 V	24 V
- Maximum	32 V	32 V
- Minimum	18 V	18 V
Current consumed	200 mA	300 mA
Effective power loss		
• at 24 V DC	4.8 W	7.2 W
Ambient temperature		
• during operation	-20 ... +70 °C	-10 ... +60 °C
• during storage	-40 ... +70 °C	-40 ... +70 °C
• during transport	-40 ... +70 °C	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%	95%
Width	60 mm	60 mm
Height	125 mm	125 mm
Depth	124 mm	124 mm
Net weight	780 g	780 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30
Standard		
• for EMI of FM	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021
• for safety of CSA	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

Technical specifications (continued)

Order No.	6GK5 204-0BA00-2BA3	6GK5 202-2BB00-2BA3
Product type description	SCALANCE X204IRT	SCALANCE X202-2IRT
Directive		
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes
Marine classification association		
• American Bureau of Shipping Europe Ltd. (ABS)	Yes	Yes
• Bureau Veritas (BV)	-	-
• Det Norske Veritas (DNV)	Yes	Yes
• Germanischer Lloyd (GL)	-	-
• Lloyds Register of Shipping (LRS)	-	-
• Nippon Kaiji Kyokai (NK)	Yes	Yes

Order No.	6GK5 202-2BH00-2BA3	6GK5 201-3BH00-2BA3	6GK5 200-4AH00-2BA3
Product type description	SCALANCE X202-2P IRT	SCALANCE X201-3P IRT	SCALANCE X200-4P IRT
Transfer rate			
• Transfer rate 1	10 Mbit/s	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s	100 Mbit/s
Number of electrical connections			
• for signaling contact	1	1	1
• for network components or terminals	2	1	-
• for redundant voltage supply	1	1	1
• for voltage supply	1	1	1
Electrical connection version			
• for signaling contact	2-pin terminal block	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 (10/100 Mbit/s; TP)	RJ45 socket (10/100 Mbit/s; TP)	-
• for voltage supply	4-pin terminal block	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables			
• at 10 Mbit/s	-	-	-
• at 100 Mbit/s	2	3	4
Version of optical port for fiber-optic cables			
• at 10 Mbit/s	-	-	-
• at 100 Mbit/s	SC RJ socket (100 Mbit/s)	SC RJ socket (100 Mbit/s)	SC RJ socket (100 Mbit/s)
Version of the C-PLUG swap medium	Yes	Yes	Yes
Type of supply voltage	DC	DC	DC
Supply voltage	24 V	24 V	24 V
• external	24 V	24 V	24 V
- Maximum	32 V	32 V	32 V
- Minimum	18 V	18 V	18 V
Current consumed	300 mA	350 mA	400 mA
Effective power loss			
• at 24 V DC	7.2 W	8.4 W	9.6 W

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

Technical specifications (continued)

Order No.	6GK5 202-2BH00-2BA3	6GK5 201-3BH00-2BA3	6GK5 200-4AH00-2BA3
Product type description	SCALANCE X202-2P IRT	SCALANCE X201-3P IRT	SCALANCE X200-4P IRT
Ambient temperature			
• during operation	0 ... +60 °C	0 ... +50 °C	0 ... +40 °C
• during storage	-40 ... +70 °C	-40 ... +70 °C	-40 ... +70 °C
• during transport	-40 ... +70 °C	-40 ... +70 °C	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%	95%	95%
Width	60 mm	60 mm	60 mm
Height	125 mm	125 mm	125 mm
Depth	124 mm	124 mm	124 mm
Net weight	780 g	780 g	780 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30	IP30
Standard	-	-	-
• for EMI of FM	FM 3611	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021	EN 50021
• for safety of CSA	-	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Directive			
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes	Yes
Marine classification association			
• American Bureau of Shipping Europe Ltd. (ABS)	-	-	-
• Bureau Veritas (BV)	-	-	-
• Det Norske Veritas (DNV)	Yes	Yes	Yes
• Germanischer Lloyd (GL)	Yes	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes	Yes
• Nippon Kaiji Kyokai (NK)	-	-	-

Order No.	6GK5 204-0JA00-2BA6	6GK5 202-2JR00-2BA6
Product type description	SCALANCE X204 IRT PRO	SCALANCE X202-2P IRT PRO
Transfer rate		
• Transfer rate 1	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s
Number of electrical connections		
• for signaling contact	1	1
• for network components or terminals	4	2
• for redundant voltage supply	1	1
• for voltage supply	1	1
Electrical connection version		
• for signaling contact	2-pin M12 interface	2-pin M12 interface
• for network components or terminals	RJ45 push-pull plug PRO socket (10/100 Mbit/s; TP)	RJ45 push-pull plug PRO socket (10/100Mbit/s; TP)
• for voltage supply	5-pin push-pull plug PRO socket	5-pin push-pull plug PRO socket

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

Technical specifications (continued)

Order No.	6GK5 204-0JA00-2BA6	6GK5 202-2JR00-2BA6
Product type description	SCALANCE X204 IRT PRO	SCALANCE X202-2P IRT PRO
Number of optical ports for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	-	2
Version of optical port for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	-	SC RJ Push Pull Plug PRO socket (100 Mbit/s)
Version of the C-PLUG swap medium	Yes	Yes
Type of supply voltage	DC	DC
Supply voltage	24 V	24 V
• external	24 V	24 V
- Maximum	-	-
- Minimum	-	-
Current consumed	350 mA	300 mA
Effective power loss		
• at 24 V DC	8.4 W	7.2 W
Ambient temperature		
• during operation	-20 ... +70 °C	0 ... +60 °C
• during storage	-40 ... +70 °C	-40 ... +70 °C
• during transport	-40 ... +70 °C	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%	95%
Width	90 mm	90 mm
Height	125 mm	125 mm
Depth	124 mm	124 mm
Net weight	1000 g	1000 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP65/67	IP65/67
Standard		
• for EMI of FM	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021
• for safety of CSA	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2
Directive		
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1	UL 60950-1, CSA C22.2 No. 60950-1
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes
Marine classification association		
• American Bureau of Shipping Europe Ltd. (ABS)	-	-
• Bureau Veritas (BV)	Yes	-
• Det Norske Veritas (DNV)	Yes	Yes
• Germanischer Lloyd (GL)	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes
• Nippon Kaiji Kyokai (NK)	-	-

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-200IRT managed

2

Ordering data

Order No.

Order No.

Industrial Ethernet Switches SCALANCE X-200IRT

Managed Industrial Ethernet switches;
Isochronous Real-Time,
LED diagnostics,
fault signaling contact with SET
button,
redundant power supply;
incl. operating instructions,
Industrial Ethernet network
manual and configuration
software on CD-ROM

- **SCALANCE X204IRT;**
4 x 10/100 Mbit/s RJ45 ports
- **SCALANCE X204IRT PRO;**
4 x 10/100 Mbit/s RJ45 push-
pull ports
- **SCALANCE X202-2IRT;**
2 x 10/100 Mbit/s RJ45 ports,
2 x 100 Mbit/s Multimode BFOC
ports
- **SCALANCE X202-2P IRT;**
2 x 10/100 Mbit/s RJ45 ports,
2 x 100 Mbit/s POF/PCF SC RJ
ports
- **SCALANCE X202-2P IRT PRO;**
2 x 10/100 Mbit/s RJ45 push-
pull ports,
2 x 100 Mbit/s POF/PCF SC RJ
push-pull ports
- **SCALANCE X201-3P IRT;**
1 x 10/100 Mbit/s RJ45 port,
3 x 100 Mbit/s POF/PCF SC RJ
ports
- **SCALANCE X200-4P IRT;**
4 x 100 Mbit/s POF/PCF SC RJ

6GK5 204-0BA00-2BA3

6GK5 204-0JA00-2BA6

6GK5 202-2BB00-2BA3

6GK5 202-2BH00-2BA3

6GK5 202-2JR00-2BA6

6GK5 201-3BH00-2BA3

6GK5 200-4AH00-2BA3

Industrial Ethernet media converter SCALANCE X-100

Industrial Ethernet media con-
verters, LED diagnostics, fault
signaling contact with SET key,
redundant power supply,
PROFINET-compatible securing
collars

- **SCALANCE X101-1POF;**
1 X 10/100 Mbit/s RJ45 port,
1 X 100 Mbit/s POF SC RJ port

6GK5 101-1BH00-2AA3

IE FC RJ45 Plug 180

RJ45 plug-in connector for
Industrial Ethernet with a rugged
metal housing and integrated
insulation displacement contacts
for connecting Industrial Ethernet
FC installation cables; with 180°
cable outlet; for network compo-
nents and CPUs/CPUs with
Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

IE RJ45 Plug PRO

RJ45 push-pull plug with degree
of protection IP65/67 for connec-
tion of the Industrial Ethernet FC
installation cables;
with 180° cable exit;
1 plug (IP65/67) for on-site
assembly

6GK1 901-1BB10-6AA0

SC RJ POF Plug

20 plugs
for on-site assembly

6GK1 900-0MB00-0AC0

SC RJ POF Plug PRO

1 plug (IP65/67)
for on-site assembly

6GK1 900-0MB00-6AA0

IE SC RJ POF refill set

Refill set for Termination Kit SC RJ
POF Plug consisting of grinding
paper and grinding plate
(set of 5)

6GK1 900-0MN00-0AA0

SC RJ PCF Plug

10 plugs
for on-site assembly

6GK1 900-0NB00-0AC0

SC RJ PCF Plug PRO

1 plug (IP65/67)
for on-site assembly

6GK1 900-0NB00-6AA0

Termination Kit SC RJ POF Plug

Assembly case for on-site instal-
lation of SC RJ POF connectors;
consisting of stripping tool,
Kevlar cutters, SC RJ grinding
plate, grinding paper,
grinding base and microscope

6GK1 900-0ML00-0AA0

Termination Kit SC RJ PCF Plug

Assembly case for local assembly
of SC RJ PCF connectors,
comprising a stripping tool,
buffer stripping tool,
Kevlar cutters, fiber breaking tool
and microscope

6GK1 900-0NL00-0AA0

Power Plug PRO

1 plug (IP65/67)
for on-site assembly (5-core)

6GK1 907-0AB10-6AA0

C-PLUG

Swap medium for simple replace-
ment of devices in the event of a
fault; for storing configuration or
engineering and application data;
can be used for SIMATIC NET
products with C-PLUG slot

6GK1 900-0AB00

SIMATIC NET Manual Collection

Electronic manuals
for communication systems,
communication protocols,
and communication products;
on DVD;
German/English

6GK1 975-1AA00-3AA0

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SIPLUS SCALANCE X-200IRT managed

Overview



- Especially designed for constructing real-time (RT) and isochronous real-time (IRT) Industrial Ethernet segments in line, star and ring topologies with 10/100 Mbit/s (Redundancy Manager integrated); construction of redundant ring connections possible
- Combination of the switching mechanisms "Cut Through" and "Store and Forward" for optimized performance
- Electrical or optical connection to stations or network in accordance with the port type of the devices
- High-speed media redundancy through integral redundancy manager both for Gigabit Ethernet (SCALANCE X-300, SCALANCE X-400) and Fast Ethernet (SCALANCE X-300 switches in the ring in combination with SCALANCE X-200 switches or OSM/ESM)
- Rugged metal enclosure for space-saving cabinet mounting on standard rails, S7-300 mounting rails, or for wall mounting
- Rugged, industry-standard station connections with PROFINET-compatible plug-in connectors that offer additional strain relief and bending strain relief thanks to latching on the housing
- Redundant power supply
- Can be used for fault-tolerant applications and can be replaced during normal operation thanks to redundant transmission characteristics
- Diagnostics on the device by means of LEDs (power, link status, data communication)
- Error signaling contact with easy adjustment using the SET button
- The devices feature PROFINET diagnostics, SNMP access, integral web server and automatic e-mail sending function for remote diagnosis and signaling over the network
- Different device versions with copper and fiber-optic interfaces (BFOC, SC RJ)
- Device variants with IP65/67 protection for cabinet-free plant concepts with PROFINET-compliant push pull connection systems

Order No.	6AG1 202-2BH00-2BA3
Order No. based on	6GK5 202-2BH00-2BA3
Product type description	SIPLUS SCALANCE X202-2P IRT
Range of ambient temperature	-25 to +60 °C; condensation permissible
Environmental conditions	Suited for exceptional medial load (e.g. by chlorine sulfur atmosphere)
Technical specifications	The technical specifications are identical with those of the based-on modules.

Additional information can be found in the Internet under:
<http://www.siemens.com/siplus-techdocu>

Ordering data	Order No.
SIPLUS SCALANCE X202-2P IRT (extended temperature range) 2 x 10/100 Mbit/s RJ45 ports, 2 x 100 Mbit/s POF/PCF SC RJ ports	6AG1 202-2BH00-2BA3
<i>Accessories</i>	see SCALANCE X-200IRT managed ordering data

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

Overview



- The SCALANCE X-300 product line consists of compact Industrial Ethernet switches for establishing electrical and/or optical line, ring and star topologies at 10/100/1000 Mbit/s
- Three integral electrical and/or optical Gigabit Ethernet interfaces (10/100/1000 Mbit/s) and seven electrical Fast Ethernet interfaces (10/100 Mbit/s) for interconnecting several switches to establish Gigabit or Fast Ethernet rings or to connect Industrial Ethernet nodes
- High-speed media redundancy through integral redundancy manager both for Gigabit Ethernet (SCALANCE X-300, SCALANCE X-400) and Fast Ethernet (SCALANCE X-300 switches in the ring in combination with SCALANCE X-200 switches or OSM/ESM)
- Switches from the SCALANCE X-300 product line support numerous IT standards and thus permit seamless integration of automation networks into existing corporate networks. Virtual networks (VLAN) can be set up.
- The support of standardized redundancy procedures (Rapid Spanning Tree Protocol) permits redundant integration into higher-level enterprise networks.
- By learning the multicast sources and destinations (IGMP Snooping and IGMP Querier (Internet Group Management Protocol)), SCALANCE X-300 switches can also filter multicast data traffic and thus limit the load on the network.
- The ports can be configured for terminals that support authentication in accordance with IEEE 802.1x. Authentication is done via a RADIUS server which has to be configured accordingly and must be able to be reached via the network.
- Rugged metal housing in S7-300 format with facility for mounting on standard DIN rail or S7-300 rail, or for direct wall-mounting in different positions
- Compact, space-saving design for installation in control cabinet
- Rugged, industry-standard node connections with PROFINET-compliant RJ45 connectors that are latched onto the housing to provide additional strain and bending relief
- Redundant power supply for protection against power failure
- Diagnostics on the device by means of LEDs (power, link status, data traffic, fault, redundancy manager)
- Fault signaling contact, can be easily set by means of the SELECT/SET pushbutton for simple display of faults
- The devices have PROFINET diagnostics, SNMP access, integral web server, and automatic e-mail function for remote diagnostics and signaling over the network.

Benefits



- High availability of the network thanks to:
 - Redundant power supply
 - Redundant network structures based on fiber-optic or twisted pair cables (redundancy manager, standby function, and RSTP are integrated)
 - Easy device replacement by means of plug-in C-PLUG swap medium
- Reliable communication thanks to very fast reconfiguration of the network in the event of a fault
- Simple fiber-optic connections thanks to SC sockets (Gigabit Ethernet and prepared fiber-optic cables)
- Secure data communication thanks to rugged device connection with PROFINET-compliant connectors that are latched onto the housing to provide additional strain and bending relief
- Easy network configuration without runtime calculation also for extremely large networks
- Simple and fast diagnostics by means of LED on the device, via PROFINET, integral web server, CLI, and signaling contact
- Integration into existing network management systems through standardized SNMP access
- Easy integration into process and system diagnostics with PROFINET
- Integrated configuring and diagnostics in SIMATIC STEP 7 provide significant benefits in engineering and startup and during the operating phase of the plant
- Load limiting when using multicast-based protocols (Voice over IP, Video) thanks to IGMP Snooping/Querier and additional multicast and broadcast limiting per port.
- Low-maintenance operation thanks to fanless construction
- Device replacement without the need for a programming device, using the C-PLUG swap medium for backing up the configuration data.
- Integration into enterprise security policies through support of VLAN
- Uncrossed connecting cables can be used due to integral Autocrossover function

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

Application

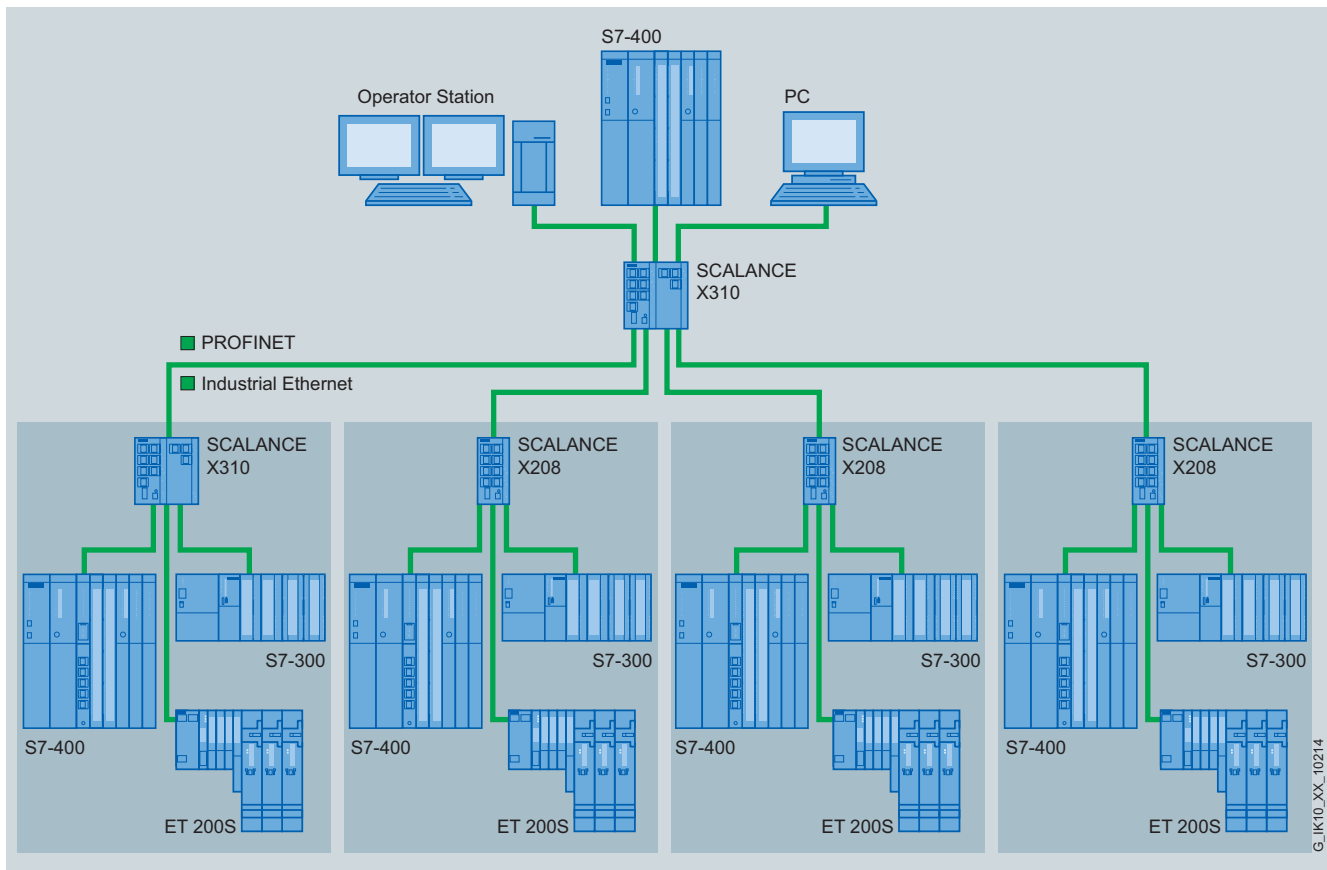
SCALANCE X-300 products enable the establishment of switched networks both at the field level and at the control level where high data transfer speeds are required in addition to high network availability and extensive diagnostics facilities. The switches are designed in degree of protection IP30 for installation in control cabinets.

The main area of application is found in high-performance plant networks with connection to the enterprise network.

Product versions

SCALANCE X310, SCALANCE X310FE

- For configuring electrical Industrial Ethernet line, star or ring structures
 - SCALANCE X310; with seven Fast Ethernet (10/100 Mbit/s) and three Gigabit Ethernet (10/100/1000 Mbit/s) ports
 - SCALANCE X310FE; with ten Fast Ethernet (10/100 Mbit/s) ports
- Device diagnostics by means of LEDs (power, link status, data traffic, fault, redundancy manager, standby manager)
- Remote diagnostics possible by means of signaling contact (signaling dialog box can be set on-site using pushbutton), PROFINET, SNMP and web browser
- The ten RJ45 sockets of the SCALANCE X310 are designed for use in industry with additional retaining collars for connecting the IE FC RJ45 Plug 180.



Electrical star topology with SCALANCE X310

SCALANCE X308-2, SCALANCE X308-2LD, SCALANCE X308-2LH, SCALANCE X308-2LH+, SCALANCE X307-3, SCALANCE X307-3LD

- For establishing optical line, ring, or star topologies with seven electrical 10/100 Mbit/s ports, one electrical 10/100/1000 Mbit/s port and two or three optical 1000 Mbit/s ports
 - SCALANCE X308-2, SCALANCE X-307-3; for glass fiber-optic cable (multi-mode) up to 750 m
 - SCALANCE X308-2LD, SCALANCE X-307-3LD for glass fiber-optic cable (single-mode) up to 10 km
 - SCALANCE X308-2LH; for glass fiber-optic cable (single-mode) up to 40 km
 - SCALANCE X308-2LH+; for glass fiber-optic cable (single-mode) up to 70 km

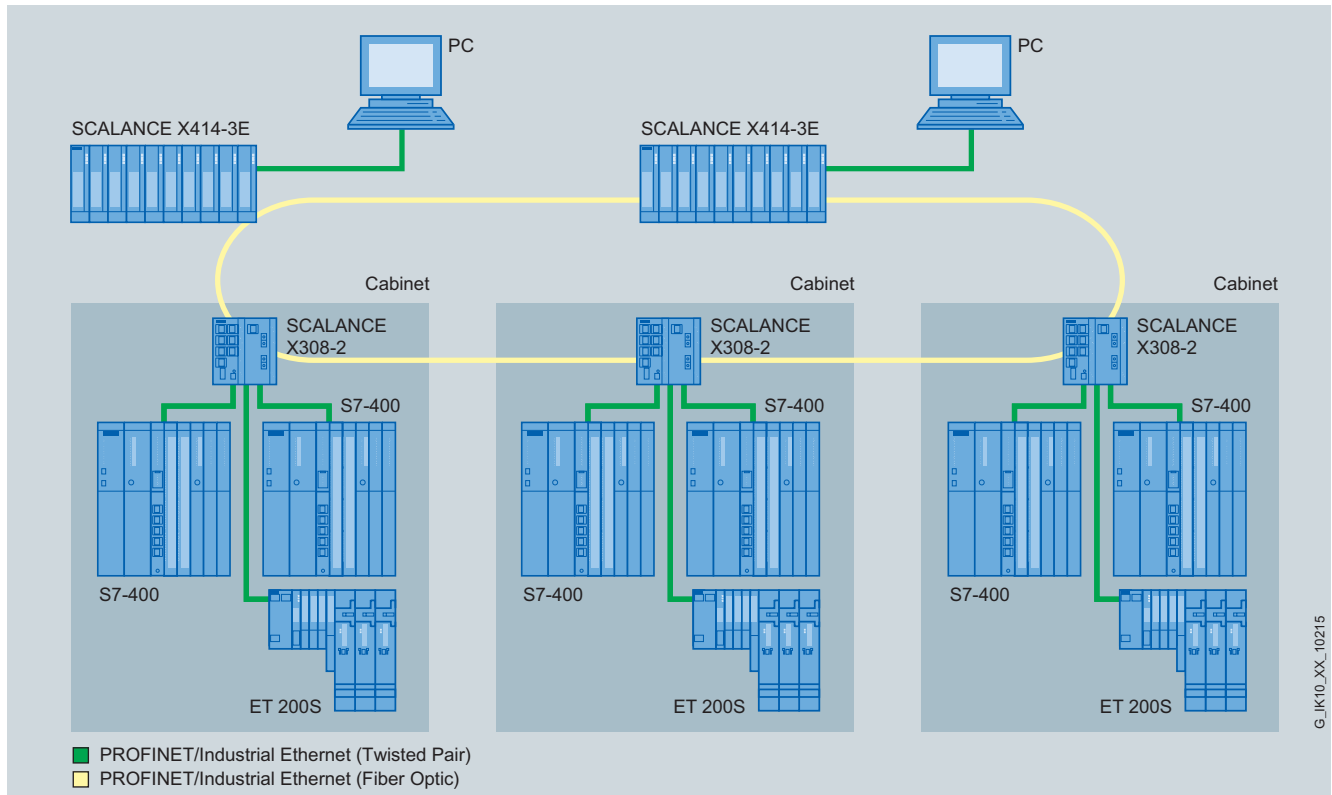
- Device diagnostics by means of LEDs (power, link status, data traffic, fault, redundancy manager, standby manager)
- Remote diagnostics possible by means of signaling contact (signaling dialog box can be set on-site using pushbutton), PROFINET, SNMP and web browser
- The RJ45 sockets are designed for use in industry with additional retaining collars for connecting the IE FC RJ45 Plug 180

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

Application (continued)



Connection of control cabinets with SCALANCE X308-2 in an optical gigabit ring

Design

The SCALANCE X-300 Industrial Ethernet switches with rugged metal housing are optimized for mounting on a standard DIN rail and the S7-300 rail. Direct wall mounting in different positions is also possible. Thanks to the S7-300 housing dimensions, the devices are suitable for integration into an automation solution with S7-300 components.

The switches have:

- a 4-pin terminal block for connecting the redundant power supply (2 x 24 V DC)
- Row of LEDs for indicating the status information (power, link status, data traffic, fault, redundancy manager, standby manager)
- A 2-pin terminal block for connecting the isolated signaling contact
- SELECT/SET key for on-site configuration of the signaling contact
- Slot for optional C-PLUG swap medium on the rear of the device for easy replacement in the event of a fault

The SCALANCE X-300 switches are available with the following port types:

- *10/100BaseTX, RJ45 connection;*
RJ45 socket, automatic detection of the data rate (10 or 100 Mbit/s), with Autosensing and Autocrossover function for the connection of IE FC cables via IE FC RJ45 Plug 180 to 100 m.
- *10/100/1000BaseTX, RJ45 connection;*
RJ45 socket, automatic detection of the data rate (10 or 100 or 1000 Mbit/s), with Autosensing and Autocrossover function for the connection of
 - IE FC cables 2x2 for 100 Mbit/s via IE FC RJ45 Plug 180 up to 100 m
 - IE FC cables 4x2 for 1000 Mbit/s via TP Cord and IE FC RJ45 Modular Outlet up to 100 m
 - IE FC cables 4x2 for 1000 Mbit/s via IE FC RJ45 Plug 4x2 up to 100 m
- *1000BaseSX, SC connections;*
SC sockets for direct connection to the Industrial Ethernet glass fiber-optic cable up to 750 m (multi-mode)
- *1000BaseSX, SC connections;*
SC sockets for direct connection to the Industrial Ethernet glass fiber-optic cable up to 10 km (single-mode)
- *1000BaseLX, SC connections;*
SC sockets for direct connection to the Industrial Ethernet glass fiber-optic cable up to 40 km (single-mode)
- *1000BaseLX, SC connections;*
SC sockets for direct connection to the Industrial Ethernet glass fiber-optic cable up to 70 km (single-mode)

Function

- Increase of the network performance; by filtering the data traffic on the basis of the Ethernet (MAC) address of the data terminals, the local data traffic remains local; only data intended for users of another subnetwork are forwarded by the switch.
- Simple network configuration and expansion; the switch saves the data received at the ports and forwards them independently to the destination address. Collision detection (CSMA/CD method) does not restrict the expansion of the network beyond the port.
- Limiting of error spreading to the associated subnetwork; the SCALANCE X-300 switches only pass on data with a valid checksum (CRC).
- Integration of existing subnetworks with 10 Mbit/s into Fast Ethernet networks with 100 Mbit/s; at the twisted-pair ports, the SCALANCE X-300 switch automatically recognizes the conductor pairs for transmission and reception (Autocrossover), the data transfer rate of 10 or 100 or 1000 Mbit/s, as well as full-duplex and half-duplex mode (Autonegotiation).
- High-performance connection of SCALANCE X-300 switches with 1 Gbit/s; SCALANCE X-300 switches have three Gigabit Ethernet ports for connecting the switches to each other or with other Gigabit-Ethernet-enabled components (e.g. SCALANCE X-400)
- Integrated redundancy manager for constructing Fast Ethernet and Gigabit Ethernet ring topologies with high-speed media redundancy. Rings consisting of SCALANCE X-300 and X-400 switches can be operated at 1000 Mbit/s. In rings with SCALANCE X-200 or OSM/ESM it is possible to integrate SCALANCE X-300 switches at 100 Mbit/s.
- High-speed standby redundancy; several network segments such as rings can be connected together redundantly with SCALANCE X-300 over the integrated standby function. Two X-300 switches are configured in a ring as a master and slave over two links to the other ring. The redundant connection can be made at 1000 Mbit/s.
- Redundant interfacing to company networks; SCALANCE X-300 switches support the standardized redundancy procedures Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP). This enables a subnetwork to be connected redundantly to a higher level corporate network with reduced requirements for the reconfiguration time (in the order of seconds).
- Support of virtual networks (VLAN); for structuring Industrial Ethernet networks with a fast growing number of users, a physically existing network can be divided into several virtual networks.
- Load limiting when multicast protocols (e.g. video transmission) are used; through learning the multicast sources and targets (IGMP Snooping, IGMP Querier), SCALANCE X-300 switches can also filter multicast data traffic and therefore limit the load in the network.
- Configuration of the ports for terminals that support authentication in accordance to IEEE 802.1x. Authentication is done via a RADIUS server which has to be configured accordingly and must be able to be reached via the network.
- Support of the DHCP Option 82 (Dynamic Host Configuration Protocol); this facilitates the IP address assignment of a terminal depending on the connected switch port. The IP address is assigned via a DHCP Server, which has to be configured accordingly and must be able to be reached via the network.

- Support from the Access Control List (ACL); if this function is activated for one port, the switch forwards the message frames received to this port if its source address is present in the address table. All connected nodes can be automatically entered in the ACL.
- Syslog; Syslog according to RFC 3164 is used in the IP network for transmitting short, unencrypted text messages via UDP. To this end, a standard Syslog server is required that has to be configured accordingly and must be able to be reached via the network.
- Time synchronization; diagnostic messages (log table entries, e-mails) are time-stamped. The local time is standardized throughout the network by means of synchronization with a SICLOCK or SNTP time transmitter, thereby simplifying the assignment of diagnostic messages to several devices.
- Fast replacement of devices in event of failure, by means of the C-PLUG switching medium

Network topology and network configuration

The SCALANCE X-300 Industrial Ethernet switches with degree of protection IP30 are typically accommodated in a control cabinet along with the nodes to be connected. The can be mixed electrically and optically in star, line and ring topologies.

The following network structures and combinations of structures can be implemented:

- Fast Ethernet and Gigabit Ethernet rings with fast media redundancy; to increase network availability, as many as 50 X-200, X-300 or X-400 switches cascaded in line can be connected into a ring with a total length of up to 150 km with multi-mode or up to 3,500 km with single-mode.
- Several rings can be redundantly linked through the standby function
- In addition, SCALANCE X-300 supports redundant connection of the ring structure to the corporate network with a rapid spanning tree.
- Star topology with SCALANCE X-300 switches: The SCALANCE X-300 switch represents a neutral point that can connect up to ten nodes or subnets with each other electrically or optically.

When configuring the network, it is necessary to observe the following boundary conditions:

- Maximum line length between two modules for multi-mode fiber-optic conductors:
 - 750 m at 1 Gbit/s
- Maximum line length between two modules for single-mode fiber-optic conductors:
 - 10 - 70 km at 1 Gbit/s
- Maximum cable length of the TP cable between two SCALANCE X switches:
 - Max. 100 m with IE FC cable 2x2 and IE FC RJ45 Plug 180
 - Max. 100 m at 1 Gbit/s with IE FC Standard Cable 4x2 (90 m), IE FC RJ45 Modular Outlet and patch cable (10 m)
 - max. 10 m using patches with TP cord

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

Function (continued)

Commissioning and diagnosis

Setting options on the device itself:

- Redundancy manager RM; to establish a ring, a SCALANCE X-300 is switched to RM mode. The Gigabit ports (electrical or optical) are preferably used as ring ports.
- Signal mask; the signal mask is set to the current status of the SCALANCE X-300 (setpoint) by pushbutton operation. The signal mask defines which ports and which power supplies are to be monitored. The signal contact only reports an error when a monitored port or a monitored feeder fails (deviation of setpoint/actual status).
- IP address; the IP address is assigned via DHCP (Dynamic Host Configuration Protocol). If there is no corresponding server in the network, the IP address can be assigned using an enclosed software tool.

Diagnostic options on site:

- The following status information is displayed by LEDs on site:
 - Port status
 - Port mode (10/100/1000 Mbit/s, full/half-duplex)
 - Status of the two power supplies
 - Signal contact status
 - Signal mask (setpoint status)
 - RM mode
 - Standby mode
- The status of the signal contact is routed externally by means of floating relay contacts. This enables, for example, the module to be monitored via an input module from a controller.
- Monitoring via the Industrial Ethernet network; the following possibilities are available:
 - Remote via standard browser (Web-based management): Selection of SCALANCE X-300 switches via the network from a PC with browser
 - Remote via SNMP V1, V2c, V3: Secure integration of SCALANCE X-300 switches via the network into a network management station, e.g. BANYnet
 - Remote via PROFINET IO diagnostics: PROFINET IO diagnostics alarms from X-300 switches can be displayed using the relevant SIMATIC engineering tools or they can also be processed in the PLC. The engineering outlay is drastically reduced for the PLC and HMI through complete integration into the SIMATIC SFM system error signaling concept.

Network management

The network management provides the following functions:

- Password-protected dial-up for "Administrator" (read and write authorization) and "User" (read only)
- Read-out of version and status information
- Setting the signal and standby mask and address information
- Fixed parameterization of the ports (data rates, half/full duplex)
- Setting parameters of the VLANs and multicast services
- Parameterization of the standby connections for a redundant ring link
- Setting of Rapid Spanning Tree parameters
- Parameterization of the web management services
- Security
 - Ports can be connected or disconnected
 - Authentication in accordance with IEEE 802.1x
 - Support from Access Control List (ACL)
- Parameterization of user administration of SNMP V1, V2c, V3
- Output of statistics information
- Diagnosis of data traffic by means of a parameterizable mirror port with a standard commercial network analyzer
- Loading new firmware updates or configuration data via the network from one TFTP server or directly via HTTP/HTTPS with an Internet or Web browser.
- Saving the configuration data or log table via the network on a TFTP server

If faults occur in the network, the SCALANCE X-300 switch can independently send error messages (traps) to a network management system or also e-mails to a predefined network administrator.

Remote monitoring (RMON) provides the following functions: The SCALANCE X-300 switch can collect statistics information according to the RMON groups 1 through 4. These include, for example, fault statistics that are kept for each port. This information can be read out through web-based management in the statistics sub-area.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

2

Technical specifications

Order No.	6GK5 310-0FA00-2AA3	6GK5 310-0BA00-2AA3
Product type description	SCALANCE X310	SCALANCE X310FE
Transfer rate		
• Transfer rate 1	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s
• Transfer rate 3	1000 Mbit/s	-
Number of electrical connections		
• for signaling contact	1	1
• for network components or terminals	10	10
• for redundant voltage supply	1	1
• for voltage supply	1	1
Electrical connection version		
• for signaling contact	2-pin terminal block	2-pin terminal block
• for network components or terminals	3 x RJ45 (10/100/1000 Mbit/s; TP), 7 x RJ45 (10/100 Mbit/s; TP)	10 x RJ45 (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	-	-
• at 1000 Mbit/s	-	-
Version of optical port for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	-	-
• at 1000 Mbit/s	-	-
Version of the C-PLUG swap medium	Yes	Yes
Type of supply voltage	DC	DC
Supply voltage	24 V	24 V
• external	24 V	24 V
- Maximum	32 V	32 V
- Minimum	18 V	18 V
Current consumed	400 mA	400 mA
Effective power loss		
• at 24 V DC	9.6 W	9.6 W
Ambient temperature		
• during operation	0 ... +60 °C	0 ... +60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%
Width	120 mm	120 mm
Height	125 mm	125 mm
Depth	124 mm	124 mm
Net weight	1400 g	1400 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

Technical specifications (continued)

Order No.	6GK5 310-0FA00-2AA3	6GK5 310-0BA00-2AA3
Product type description	SCALANCE X310	SCALANCE X310FE
Standard		
• for EMI of FM	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021
• for safety of CSA	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2
Directive		
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 Nr. 60950-1; UL 508, CSA C22.2 Nr. 14-M91; UL 1604 and 2279 (Hazardous Location)	UL 60950-1, CSA C22.2 Nr. 60950-1; UL 508, CSA C22.2 Nr. 14-M91; UL 1604 and 2279 (Hazardous Location)
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes
• e-symbol	-	-
Marine classification association		
• American Bureau of Shipping Europe Ltd. (ABS)	-	-
• Bureau Veritas (BV)	-	-
• Det Norske Veritas (DNV)	-	-
• Europe Ltd. (ABS)	-	-
• Germanischer Lloyd (GL)	-	-
• Lloyds Register of Shipping (LRS)	-	-
• Nippon Kaiji Kyokai (NK)	-	-

Order No.	6GK5 308-2FL00-2AA3	6GK5 308-2FM00-2AA3	6GK5 308-2FN00-2AA3	6GK5 308-2FP00-2AA3
Product type description	SCALANCE X308-2	SCALANCE X308-2LD	SCALANCE X308-2LH	SCALANCE X308-2LH+
Transfer rate				
• Transfer rate 1	10 Mbit/s	10 Mbit/s	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s	100 Mbit/s	100 Mbit/s
• Transfer rate 3	1000 Mbit/s	1000 Mbit/s	1000 Mbit/s	1000 Mbit/s
Number of electrical connections				
• for signaling contact	1	1	1	1
• for network components or terminals	8	8	8	8
• for redundant voltage supply	1	1	1	1
• for voltage supply	1	1	1	1
Electrical connection version				
• for signaling contact	2-pin terminal block	2-pin terminal block	2-pin terminal block	2-pin terminal block
• for network components or terminals	1 x RJ45 (10/100/1000 Mbit/s; TP), 7 x RJ45 (10/100 Mbit/s; TP)	1 x RJ45 (10/100/1000 Mbit/s; TP), 7 x RJ45 (10/100 Mbit/s; TP)	1 x RJ45 (10/100/1000 Mbit/s; TP), 7 x RJ45 (10/100 Mbit/s; TP)	1 x RJ45 (10/100/1000 Mbit/s; TP), 7 x RJ45 (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables				
• at 10 Mbit/s	-	-	-	-
• at 100 Mbit/s	-	-	-	-
• at 1 Gbit/s	2	2	2	2
Version of optical port for fiber-optic cables				
• at 10 Mbit/s	-	-	-	-
• at 100 Mbit/s	-	-	-	-
• at 1 Gbit/s	Glass fiber-optic cable (multi-mode) with SC socket (1000 Mbit/s)	Glass fiber-optic cable (single-mode) with SC socket (1000 Mbit/s)	Glass fiber-optic cable (single-mode LH) with SC socket (1000 Mbit/s)	Glass fiber-optic cable (single-mode LH+) with SC socket (1000 Mbit/s)

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

Technical specifications (continued)

Order No.	6GK5 308-2FL00-2AA3	6GK5 308-2FM00-2AA3	6GK5 308-2FN00-2AA3	6GK5 308-2FP00-2AA3
Product type description	SCALANCE X308-2	SCALANCE X308-2LD	SCALANCE X308-2LH	SCALANCE X308-2LH+
Version of the C-PLUG swap medium	Yes	Yes	Yes	Yes
Type of supply voltage	DC	DC	DC	DC
Supply voltage	24 V	24 V	24 V	24 V
• external	24 V	24 V	-	-
- Maximum	32 V	32 V	-	-
- Minimum	18 V	18 V	-	-
Current consumed	400 mA	400 mA	400 mA	400 mA
Effective power loss				
• at 24 V DC	9.6 W	9.6 W	9.6 W	9.6 W
Ambient temperature				
• during operation	0 ... +60 °C	0 ... +60 °C	0 ... +60 °C	0 ... +60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%	95%	95%
Width	120 mm	120 mm	120 mm	120 mm
Height	125 mm	125 mm	125 mm	125 mm
Depth	124 mm	124 mm	124 mm	124 mm
Net weight	1400 g	1400 g	1400 g	1400 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30	IP30	IP30
Standard				
• for EMI of FM	FM 3611	FM 3611	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021	EN 50021	EN 50021
• for safety of CSA	-	-	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2	EN 61000-6-2
Directive				
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 Nr. 60950-1; UL 508, CSA C22.2 Nr. 14-M91; UL 1604 and 2279 (Hazardous Location)	UL 60950-1, CSA C22.2 Nr. 60950-1; UL 508, CSA C22.2 Nr. 14-M91; UL 1604 and 2279 (Hazardous Location)	UL 60950-1, CSA C22.2 Nr. 60950-1; UL 508, CSA C22.2 Nr. 14-M91; UL 1604 and 2279 (Hazardous Location)	UL 60950-1, CSA C22.2 Nr. 60950-1; UL 508, CSA C22.2 Nr. 14-M91; UL 1604 and 2279 (Hazardous Location)
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes	Yes	Yes
Marine classification association				
• American Bureau of Shipping Europe Ltd. (ABS)	-	-	-	-
• Bureau Veritas (BV)	-	-	-	-
• Det Norske Veritas (DNV)	-	-	-	-
• Germanischer Lloyd (GL)	-	-	-	-
• Lloyds Register of Shipping (LRS)	-	-	-	-
• Nippon Kaiji Kyokai (NK)	-	-	-	-

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

Technical specifications (continued)

Order No.	6GK5 307-3BL00-2AA3	6GK5 307-3BM00-2AA3
Product type description	SCALANCE X307-3	SCALANCE X307-3LD
Transfer rate		
• Transfer rate 1	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s
• Transfer rate 3	1000 Mbit/s	1000 Mbit/s
Number of electrical connections		
• for signaling contact	1	1
• for network components or terminals	7	7
• for redundant voltage supply	1	1
• for voltage supply	1	1
Electrical connection version		
• for signaling contact	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 (10/100 Mbit/s; TP)	RJ45 (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	-	-
• at 1000 Mbit/s	3	3
Version of optical port for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	-	-
• at 1000 Mbit/s	Glass fiber-optic cable (multi-mode) with SC socket (1000 Mbit/s)	Glass fiber-optic cable (single-mode) with SC socket (1000 Mbit/s)
Version of the C-PLUG swap medium	Yes	Yes
Type of supply voltage	DC	DC
Supply voltage	24 V	24 V
• external	24 V	24 V
- Maximum	32 V	32 V
- Minimum	18 V	18 V
Current consumed	400 mA	400 mA
Effective power loss		
• at 24 V DC	9,6 W	9,6 W
Ambient temperature		
• during operation	0 ... +60 °C	0 ... +60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%
Width	120 mm	120 mm
Height	125 mm	125 mm
Depth	124 mm	124 mm
Net weight	1400 g	1400 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

Technical specifications (continued)

Order No.	6GK5 307-3BL00-2AA3	6GK5 307-3BM00-2AA3
Product type description	SCALANCE X307-3	SCALANCE X307-3LD
Standard		
• for EMI of FM	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021
• for safety of CSA	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2
Directive		
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 Nr. 60950-1; UL 508, CSA C22.2 Nr. 14-M91; UL 1604 and 2279 (Hazardous Location)	UL 60950-1, CSA C22.2 Nr. 60950-1; UL 508, CSA C22.2 Nr. 14-M91; UL 1604 and 2279 (Hazardous Location)
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes
Marine classification association		
• American Bureau of Shipping Europe Ltd. (ABS)	-	-
• Bureau Veritas (BV)	-	-
• Det Norske Veritas (DNV)	-	-
• Germanischer Lloyd (GL)	-	-
• Lloyds Register of Shipping (LRS)	-	-
• Nippon Kaiji Kyokai (NK)	-	-

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-300 managed

2

Ordering data

Order No.

Order No.

SCALANCE X-300 Industrial Ethernet switches

Industrial Ethernet switches for setting up electrical and/or optical Industrial Ethernet networks; integrated redundancy manager, IT functions (RSTP, VLAN, etc.), network management via SNMP and web server; incl. operating instructions, Industrial Ethernet network manual and configuration software on CD-ROM; C-PLUG included in the scope of supply

- **SCALANCE X310;**
3 x 10/100/1000 Mbit/s RJ45 ports,
7 x 10/100 Mbit/s RJ45 ports
- **SCALANCE X310FE;**
10 x 10/100 Mbit/s RJ45 ports
- **SCALANCE X308-2;**
2 x 1000 Mbit/s multi-mode fiber-optic ports (SC sockets),
1 x 10/100/1000 Mbit/s RJ45 port,
7 x 10/100 Mbit/s RJ45 ports;
for glass fiber-optic cables (multi-mode) up to a max. 750 m.
- **SCALANCE X308-2LD;**
2 x 1000 Mbit/s single-mode fiber-optic ports (SC sockets),
1 x 10/100/1000 Mbit/s RJ45 port,
7 x 10/100 Mbit/s RJ45 ports;
for glass fiber-optic cables (single-mode) up to a max. 10 km.
- **SCALANCE X308-2LH;**
2 x 1000 Mbit/s single-mode fiber-optic ports (SC sockets),
1 x 10/100/1000 Mbit/s RJ45 port,
7 x 10/100 Mbit/s RJ45 ports;
for glass fiber-optic cables (single-mode) up to a max. 40 km.
- **SCALANCE X308-2LH+;**
2 x 1000 Mbit/s single-mode fiber-optic ports (SC sockets),
1 x 10/100/1000 Mbit/s RJ45 port,
7 x 10/100 Mbit/s RJ45 ports;
for glass fiber-optic cables (single-mode) up to a max. 70 km.
- **SCALANCE X307-3;**
3 x 1000 Mbit/s multi-mode fiber-optic ports (SC sockets),
7 x 10/100 Mbit/s RJ45 ports,
for glass fiber-optic cables (multi-mode) up to a max. 750 m.
- **SCALANCE X307-3LD;**
3 x 1000 Mbit/s single-mode fiber-optic ports (SC sockets),
7 x 10/100 Mbit/s RJ45 ports,
for glass fiber-optic cables (single-mode) up to a max. 10 km.

6GK5 310-0FA00-2AA3

6GK5 310-0BA00-2AA3

6GK5 308-2FL00-2AA3

6GK5 308-2FM00-2AA3

6GK5 308-2FN00-2AA3

6GK5 308-2FP00-2AA3

6GK5 307-3BL00-2AA3

6GK5 307-3BM00-2AA3

Accessories

IE FC RJ45 Modular Outlet

FastConnect RJ45 outlet for Industrial Ethernet with interface for replaceable insert;

- **With insert 2FE;**
replaceable insert
for 2 x 100 Mbit/s interfaces
- **With insert 1GE;**
replaceable insert
for 1 x 1000 Mbit/s interfaces

6GK1 901-1BE00-0AA1

6GK1 901-1BE00-0AA2

Accessories (continued)

IE FC TP Standard Cable GP 2 x 2 (Type A)

4-core, shielded TP installation cable for connection to IE FC RJ45 outlet / IE FC RJ45 plug; PROFINET-conforming; with UL approval; sold by the meter; max. quantity 1000 m, minimum order 20 m

6XV1 840-2AH10

IE FC TP Standard Cable GP 4 x 2

8-core, shielded TP installation cable for connection to IE FC RJ45 Modular Outlet for universal application; with UL approval; sold by the meter; max quantity 1000 m, minimum order 20 m

6XV1 870-2E

IE TP Cord RJ45/RJ45

TP cable 4 x 2
with two RJ45 plugs

- 0.5 m
- 1 m
- 2 m
- 6 m
- 10 m

6XV1 870-3QE50

6XV1 870-3QH10

6XV1 870-3QH20

6XV1 870-3QH60

6XV1 870-3QN10

IE FC RJ45 Plug 180

RJ45 plug-in connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

IE FC RJ45 Plug 4 x 2

RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB11-2AA0

6GK1 901-1BB11-2AB0

6GK1 901-1BB11-2AE0

C-PLUG

Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot

6GK1 900-0AB00

SIMATIC NET Manual Collection

Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English

6GK1 975-1AA00-3AA0

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SIPLUS SCALANCE X-300 managed

Overview



- The SCALANCE X-300 product line consists of compact Industrial Ethernet switches for establishing electrical and/or optical line, ring and star topologies at 10/100/1000 Mbit/s
- Three integral electrical and/or optical Gigabit Ethernet interfaces (10/100/1000 Mbit/s) and seven electrical Fast Ethernet interfaces (10/100 Mbit/s) for interconnecting several switches to establish Gigabit or Fast Ethernet rings or to connect Industrial Ethernet nodes
- High-speed media redundancy through integral redundancy manager both for Gigabit Ethernet (SCALANCE X-300, SCALANCE X-400) and Fast Ethernet (SCALANCE X-300 switches in the ring in combination with SCALANCE X-200 switches or OSM/ESM)
- Switches from the SCALANCE X-300 product line support numerous IT standards and thus permit seamless integration of automation networks into existing corporate networks. Virtual networks (VLAN) can be set up
- The support of standardized redundancy procedures (Rapid Spanning Tree Protocol) permits redundant integration into higher-level enterprise networks
- By learning the multicast sources and destinations (IGMP Snooping and IGMP Querier (Internet Group Management Protocol)), SCALANCE X-300 switches can also filter multicast data traffic and thus limit the load on the network.
- The ports can be configured for terminals that support authentication in accordance with IEEE 802.1x. Authentication is done via a RADIUS server which has to be configured accordingly and must be able to be reached via the network.
- Rugged metal enclosure in S7-300 format with facility for mounting on standard DIN rails or S7-300 mounting rails, or for direct wall-mounting in different positions

- Compact, space-saving design for installation in control cabinet
- Rugged, industry-standard node connections with PROFINET-compliant RJ45 connectors that latch onto the enclosure to offer additional strain and bending relief
- Redundant power supply for protection against power failure
- Diagnostics on the device by means of LEDs (power, link status, data traffic, fault, redundancy manager)
- Fault signaling contact, can be easily set by means of the SELECT/SET pushbutton for simple display of faults
- The devices feature PROFINET diagnostics, SNMP access, integral web server, and automatic e-mail function for remote diagnostics and signaling over the network.

Order No.	6AG1 308-2FL00-4AA3
Order No. based on	6GK5 308-2FL00-2AA3
Product type description	SIPLUS SCALANCE X308-2
Environmental conditions	Suited for exceptional medial load (e.g. by chlorine sulfur atmosphere)
Technical specifications	The technical specifications are identical with those of the based-on modules.

Additional information can be found in the Internet under:

<http://www.siemens.com/siplus-techdocu>

Ordering data	Order No.
SIPLUS SCALANCE X308-2 (medial load) 2 x 1000 Mbit/s multi-mode fiber-optic ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cables (multi-mode) up to a max. 750 m.	6AG1 308-2FL00-4AA3
Accessories	see SCALANCE X-300 managed ordering data

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

Overview



- The SCALANCE X-400 product range comprises modular Industrial Ethernet switches expandable by various media modules and partially by extenders. It supports 10/100/1000-Mbit technology for various transmission media (twisted pair, fiber optic) and increased port requirements. The main applications are high-performance plant networks (control level). Thanks to its partly modular design, the X-400 product line is also designed for future requirements and can be adapted to the relevant task.
- The SCALANCE X-400 Industrial Ethernet switches have two to four integral Gigabit Ethernet twisted pair interfaces (10/100/1000 Mbit/s) for connecting a number of switches to one another. Nodes are connected via the Fast Ethernet twisted pair ports (10/100 Mbit/s) integrated in the basic device.
- In the case of SCALANCE X414-3E, another eight stations can be connected via extender modules on the basic device. The following extender modules are available:
 - Extenders with eight Fast Ethernet twisted-pair ports
 - Extenders with four media module slots for up to eight Fast Ethernet fiber optic ports
- The integrated redundancy manager facilitates high-speed media redundancy even for large networks, both for Gigabit Ethernet (SCALANCE X-400/X300 switches in the ring) and for Fast Ethernet (SCALANCE X-400 switches in the ring in combination with SCALANCE X-200 switches or OSM/ESM).
- For the construction of optical Gigabit Ethernet rings, the integrated Gigabit Ethernet ports can be converted to fiber optic via a 2-port Gigabit Ethernet media module (MM). Module variants for multimode (up to 750 m FOC) and single mode (up to 70 km) are available.
- By means of pluggable 2-port Fast Ethernet media modules for multimode or alternatively single-mode fiber-optic cable, SCALANCE X-400 switches can also be integrated into 100-Mbit/s rings, e.g. with SCALANCE X204-2 or OSM. It is then possible to also provide an optical link to remote stations.
- Remote diagnosis is possible by means of PROFINET diagnostics, CLI, web browser or SNMP.
- Switches of the SCALANCE X-400 product line support IT standards and thus permit seamless integration of automation networks into existing corporate networks. Virtual networks (VLAN) can be set up.
- The support of standardized redundancy procedures (Rapid Spanning Tree Protocol) permits the redundant integration into higher level enterprise networks.

- Through learning the Multicast sources and targets (IGMP (Internet **G**roup **M**anagement **P**rotocol snooping), SCALANCE X-400 switches can also filter Multicast data traffic and therefore limit the load in the network.
- In the case of SCALANCE X414-3E, Layer 3 switching (IP routing) permits the creation of IP subnets and IP router communication
 - Static routing
 - Dynamic routing OSPF (**O**pen **S**horte**S**t **P**ath **F**irst) and RIPv1/2 (Routing Information Protocol)
 - Redundant routing VRRP (**V**irtual **R**outer **R**edundancy **P**rotocol)

Benefits



- Flexible configuration of electrical or optical Industrial Ethernet networks; the network topology, type and number of ports can be adapted easily to the structure of the plant.
- High availability of the network thanks to:
 - Redundant power supply
 - Redundant network structures based on fiber-optic or twisted pair cables (redundancy manager, standby function, RSTP and VRRP are integrated)
 - Replacement and extension of media and expansion modules during operation
 - Easy device replacement by means of plug-in C-PLUG swap medium
- Reliable communication thanks to very fast reconfiguration of the network in the event of a fault
- Simple fiber optic connection technology by means of SC sockets (Gigabit Ethernet), BFOC sockets (Fast Ethernet) and prefabricated fiber optic cables
- Twisted pair ports readily accessible from the front, 10/100/1000 Mbit/s; ports with sleeve for rugged, industry-compatible station connection for direct connections up to 100 m in conjunction with the PROFINET-compatible IE FC RJ45 Plug 180 or IE FC RJ45 Plug 145 connector
- Easy network configuration without runtime calculation also for extremely large networks
- Simple monitoring and diagnosis by means of signaling contact, digital inputs, SNMP, Syslog and e-mail; PROFINET IO diagnostics
- Reduced engineering expenditure for PLC/HMI due to integration into the SIMATIC system fault message concept SFM
- Thanks to the integrated Layer 3 function (IP routing) – static, dynamic and redundant – of SCALANCE X414-3E, networks can be divided into different subnets
- Investment protection for existing networks due to
 - Effortless connection of existing 10 Mbit/s data terminals or network segments to Fast Ethernet networks with 100 Mbit/s
 - Increase in performance through load decoupling and data transfer rates of 100 Mbit/s and 1000 Mbit/s
 - Easy integration into existing network management infrastructures by means of SNMP
- Support of VLAN permits integration into Enterprise Security Policies
- Limiting of load on application of Multicast-based protocols (e.g. video transmission) through IGMP (Internet **G**roup **M**anagement **P**rotocol) snooping or GMRP (**G**ARP **M**ulticast **R**egistration **P**rotocol)
- Protection of network against overload by setting of port thresholds
- Operating temperature range from 0 °C to +60 °C
- Low-maintenance operation thanks to fanless construction

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

2

Application

SCALANCE X-400 products permit the configuration of switched networks at the control level, which not only demands high availability of the network and extensive diagnostic options, but also a high number of ports, high transfer rate and the support of fiber optic and twisted-pair transmission media. SCALANCE X-400 products are designed with degree of protection IP20 for installation in control cabinets.

SCALANCE X408-2

- Control stations with a low concentration of devices
- Star hub in plant bus for applications with low concentration of devices
- High-speed backbone including high-speed media redundancy for process control systems
- In the high-speed backbone for coupling Gigabit network topologies

SCALANCE X414-3E

- Control stations with a high concentration of devices
- Star hub in plant bus for applications with high concentration of devices
- High-speed backbone including high-speed media redundancy for process control systems
- SCALANCE X414-3E equipped with Layer 3 for IP routing (static, dynamic, redundant)

Design

SCALANCE X408-2/SCALANCE X414-3

Communication connections:

- Integral Gigabit Ethernet twisted pair ports (10/100/1000 Mbit/s, RJ45 sockets) for connecting SCALANCE X-400 switches together:
 - *SCALANCE X408-2*:
4 Gigabit Ethernet twisted pair ports
 - *SCALANCE X414-3E*:
2 Gigabit Ethernet twisted pair ports
- Integral Fast Ethernet twisted pair ports (10/100 Mbit/s, RJ45 sockets with securing collar) for node connection
 - *SCALANCE X408-2*:
4 Fast Ethernet twisted pair ports
 - *SCALANCE X414-3E*:
12 Fast Ethernet twisted pair ports
- The Gigabit Ethernet ports can be converted to fiber-optic connections with optical Gigabit Ethernet media modules

Only for *SCALANCE X408-2*:

- Two universal slots either for optical Fast Ethernet or Gigabit Ethernet media modules with two ports

Only for *SCALANCE X414-3E*:

- Two slots for optical Fast Ethernet media modules with two ports
- One extender interface for expansion by 8 Fast Ethernet ports (twisted pair or fiber optic, depending on extender version). In this way, a maximum configuration of two Gigabit Ethernet Ports (electrical or optical) and up to 24 Fast Ethernet Ports (of which between 2 and 12 can be optical) is possible. The installation width including extender is max. 19".

Interfaces

- Console port (serial interface) for on-site parameterization/diagnostics, for firmware update;
- Slot for C-PLUG swap media for easy device replacement (included in scope of supply)
- Redundant 24 V DC supply; two feeds are available for protection against voltage failure
- One floating message output for simple display of faults

Only for *SCALANCE X414-3E*:

- Additional out-band Ethernet port for on-site parameterization/diagnostics
- Eight floating inputs for recording digital status information such as signal contacts of PROFIBUS OLM or door contacts and forwarding via SCALANCE X-400 diagnostic paths (LED indicator, log table, trap or Email)

Extensive operating mode and status information is displayed via LEDs and selection pushbuttons.

SCALANCE X-400 media modules (MM)

SCALANCE X-400 switches can be equipped with 2-port media modules. Media modules are available for both multimode and single-mode optical fibers. They can be added or replaced during network operation. The SCALANCE X414-3E basic unit supports two optical Gigabit Ethernet ports and up to four additional optical Fast Ethernet ports.

On two media-module slots, SCALANCE X408-2 supports as many as four optical ports which can optionally be equipped with optical Gigabit Ethernet or Fast Ethernet media modules.

The following media modules are available:

- MM491-2;
2 fiber optic ports (BFOC sockets) 100 Mbit/s for distances up to 3 km with multimode fiber-optic conductors
- MM491-2LD;
two fiber optic ports (BFOC sockets) 100 Mbit/s for distances up to 26 km with single-mode fiber-optic conductors
- MM491-2LH+;
two fiber optic ports (SC sockets) 100 Mbit/s for distances up to 70 km with single-mode fiber-optic conductors
- MM492-2;
two fiber optic ports (SC sockets) 1 Gbit/s for distances up to 750 m with multimode fiber-optic conductors (when using SIMATIC NET FO cable 50/125µm)
- MM492-2LD;
two fiber optic ports (SC sockets) 1 Gbit/s for distances up to 10 km with single-mode fiber-optic conductors
- MM492-2LH;
two fiber optic ports (SC sockets) 1 Gbit/s for distances up to 40 km with single-mode fiber-optic conductors
- MM492-2LH+;
two fiber optic ports (SC sockets) 1 Gbit/s for distances up to 70 km with single-mode fiber-optic conductors

Plug-in media modules for Gigabit Ethernet convert the two Gigabit Ethernet twisted pair-ports included in the switch to optical mode. The Gigabit ports can then be used as either twisted-pair or fiber-optic ports. In the case of the SCALANCE X414-3E basic device, optical media modules for Fast Ethernet each generate two additional ports per slot.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

Design (continued)

SCALANCE X-400 extender module (EM), only for SCALANCE X414-3E

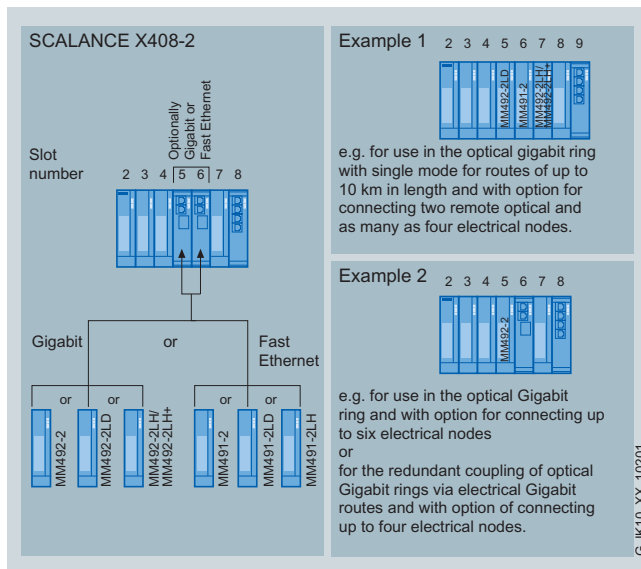
An optional extender module with up to eight further Fast Ethernet ports can be mounted next to the expansion interface of the SCALANCE X414-3E.

Versions:

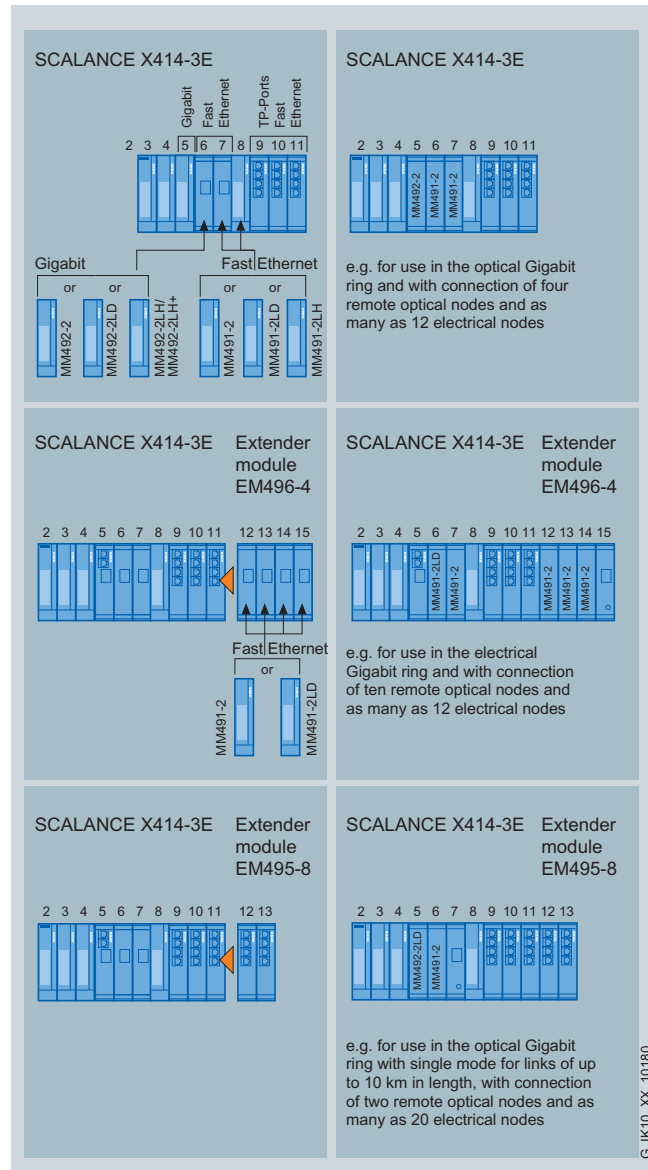
- EM495-8;
with 8 twisted pair ports (RJ45 sockets with sleeves)
10/100 Mbit/s; this enables the 12 onboard Fast Ethernet
twisted pair ports of the SCALANCE X414-3E to be expanded
to a total of 20 ports.
- EM496-4;
with a further four media module slots for Fast Ethernet media
modules for up to 8 optical Fast Ethernet ports

The structure of the SCALANCE X-400 product line offers the following advantages:

- Simple user connection via twisted pair
- Gigabit Ethernet transfer rate between SCALANCE X-400 switches
- Fiber optic connection via fiber-optic media modules
- Reduced costs for spare parts inventories;
Electrical and optical variants are covered by a basic unit and
fiber-optic media modules



Possible applications of the media modules with SCALANCE X408-2



Possible applications of the media and extender modules with SCALANCE X 414-3

Function

- Increasing the network performance; by filtering the data traffic on the basis of the Ethernet (MAC) address of the data terminals, the local data traffic remains local; only data intended for users of another subnetwork are forwarded by the switch.
- Simple network configuration and expansion; the switch saves the data received at the ports and forwards them independently to the destination address. Collision detection (CSMA/CD method) does not restrict the expansion of the network beyond the port.
- Limiting of error spreading to the associated subnetwork; the SCALANCE X-400 switches only pass on data with a valid checksum (CRC).
- Integration of existing subnetworks with 10 Mbit/s into Fast Ethernet networks with 100 Mbit/s; at the twisted-pair ports, the SCALANCE X-400 switch automatically recognizes the conductor pairs for transmission and reception (autocrossover), the data transfer rate of 10 or 100 Mbit/s, as well as full-duplex and half-duplex operation (autonegotiation).
- High-performance connection of SCALANCE X-400 switches with 1 Gbit/s; SCALANCE X-400 switches have two (X414-3E) or four (X408-2) Gigabit Ethernet ports for connecting the switches to each other.
- Integrated redundancy manager for constructing Fast Ethernet and Gigabit Ethernet ring topologies with high-speed media redundancy. Rings consisting of SCALANCE X-300 and X-400 switches can be operated at 1000 Mbit/s. In rings with SCALANCE X-200, X300 or OSM/ESM it is possible to integrate SCALANCE X-400 switches at 100 Mbit/s.
- High-speed standby redundancy; several network segments such as rings can be connected together redundantly with SCALANCE X-400 over the integrated standby function. Two X-400 switches are configured in a ring as a master and slave over two links to the other ring. In the case of SCALANCE X408-2 or SCALANCE X-300, a high-performance redundant coupling at 1000 Mbit/s is possible.
- Redundant interfacing to company networks; SCALANCE X-400 switches support the standardized redundancy procedures Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP). This enables a subnetwork to be connected redundantly to a higher level corporate network with reduced requirements for the reconfiguration time (in the order of seconds).
- Support of virtual networks (VLAN); for structuring Industrial Ethernet networks with a fast growing number of users, a physically existing network can be divided into several virtual networks.
- Integrated hardware Layer 3 Switching function (IP routing, only SCALANCE X414-3E); IP subnetworks can be created and interconnected, e.g. automation network with office network, enabling a structuring of the networks
- Load limiting with use of Multicast protocols (e.g. video transmission); through learning the Multicast sources and targets (IGMP snooping), SCALANCE X-400 switches can also filter Multicast data traffic and therefore limit the load in the network.
- Time synchronization; diagnostics messages (log table entries, e-mails) are time-stamped. The local time is standardized throughout the network by means of synchronization with a SICLOCK or SNTP time transmitter, thereby simplifying the assignment of diagnostic messages to several devices.
- Fast replacement of devices in event of failure, by means of the C-PLUG switching medium

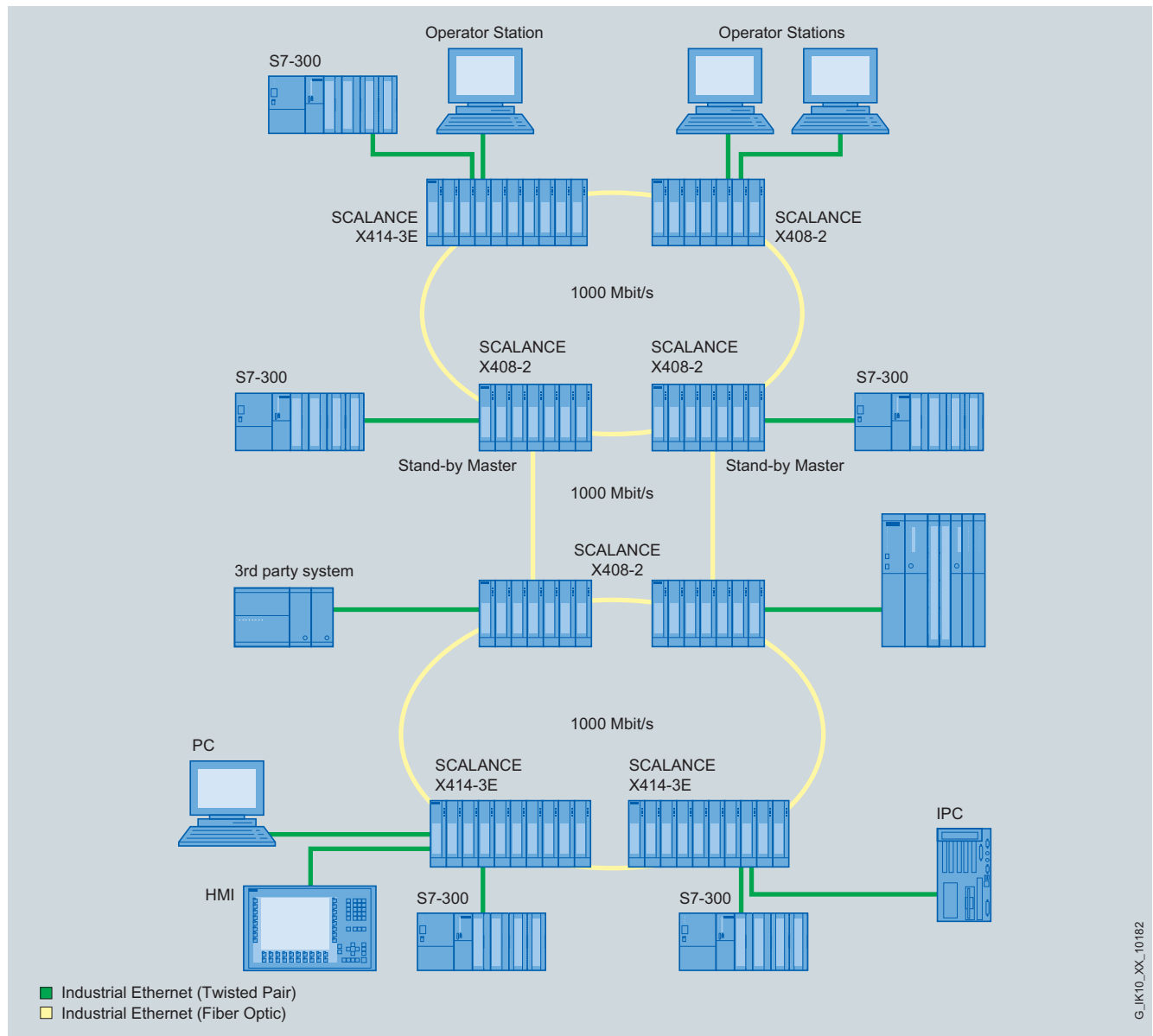
PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

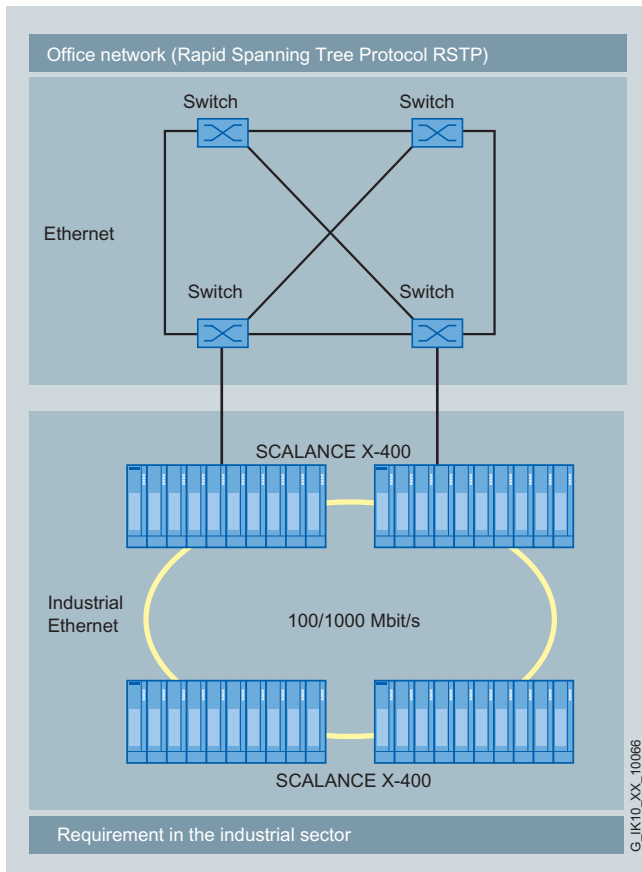
Function (continued)

2



Optical redundant connection of two optical Gigabit subnets with SCALANCE X-400 on Layer 2 and Layer 3

Function (continued)



Redundant coupling with an Office network and industrial network on Layer 2 and Layer 3

Network topology and network configuration

The network topology can easily be adapted to the structure of the plant with SCALANCE X-400 Industrial Ethernet switches. The following network structures and combinations of structures can be implemented:

- Fast Ethernet and Gigabit rings with fast media redundancy; to protect against failure of a transmission link or a switch, as many as 50 X-400 switches cascaded in line can be connected into a ring with a total length of up to 150 km using multi-mode or 3,500 km using single mode. On the failure of a transmission link or a SCALANCE X-400 switch in the ring, the transmission path is quickly reconfigured due to the media redundancy.
- Several rings can be redundantly linked through the standby function
- In addition, SCALANCE X-400 supports redundant connection of the ring structure to the corporate network with a rapid spanning tree.
- Star topology with SCALANCE X-400 switches:
The SCALANCE X-414-3E switch represents a star point which can interconnect as many as 26 nodes or subnetworks electrically or optically; SCALANCE X408-2 can connect up to 8 nodes or subnetworks

When configuring the network, it is necessary to observe the following boundary conditions:

- Maximum line length between two modules for multi-mode fiber-optic conductors:
 - 3000 m at 100 Mbit/s
 - 750 m at 1 Gbit/s
- Maximum line length between two modules for single-mode fiber-optic conductors:
 - 70 km at 100 Mbit/s
 - 70 km at 1 Gbit/s
- Maximum length of installation cable:
 - 100 m at 100 Mbit/s with IE FC TP cable 2 x 2 and IE FC Plug 180
 - Max. 90 m at 1 Gbit/s with IE FC TP Cable 4 x 2, IE FC RJ45 Modular Outlet and patch cable (10 m)
 - 100 m at 1000 Mbit/s with IE FC TP cable 4 x 2 and IE FC Plug 4 x 2

Commissioning and diagnosis

Adjustment options on the device itself:

- Redundancy manager RM; to establish a ring, a SCALANCE X-400 is switched to RM mode. The Gigabit ports (electrical or – with media module – optical) are preferably used as ring ports. When using in optical rings with 100 Mbit/s, the ring ports can be configured on one media module or on two media modules.
- Signal mask; the signal mask is set to the current status of the SCALANCE X-400 (setpoint) by pushbutton operation. The signal mask defines which ports and which power supplies are to be monitored. The signal contact only reports an error when a monitored port or a monitored feeder fails (deviation of setpoint/actual status).

Diagnostic options on site:

- The following status information is displayed by LEDs on site:
 - Port status
 - Port mode (10/100/1000 Mbit/s, full/half-duplex)
 - Status of the two voltage feeders
 - Signal contact status
 - Signal mask (setpoint status)
 - RM mode
 - Standby mode
- The status of the signal contact is routed externally by means of floating relay contacts. This enables, for example, the module to be monitored via an input module from a controller.
- A PC or a programming device can be directly connected via a serial interface or, with the X414-3E, also via an Ethernet interface (out-band port). Operation is carried out using commands (**Command Line Interface (CLI)**).
- Monitoring via the Industrial Ethernet network; the following possibilities are available:
 - Remote via standard browser (Web-based management): Selection of SCALANCE X-400 switches via the network from a PC with browser
 - Remote via SNMP V1, V2c, V3: Secure integration of SCALANCE X-400 switches via the network into a network management station
 - Remote via PROFINET IO diagnostics
 - Standard diagnostic alarms can be configured in an easy, familiar manner in STEP 7 and processed in SIMATIC. The engineering outlay is drastically reduced for the PLC and HMI through complete integration in the SIMATIC system error message concept SFM.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

Function (continued)

Network management

The network management provides the following functions:

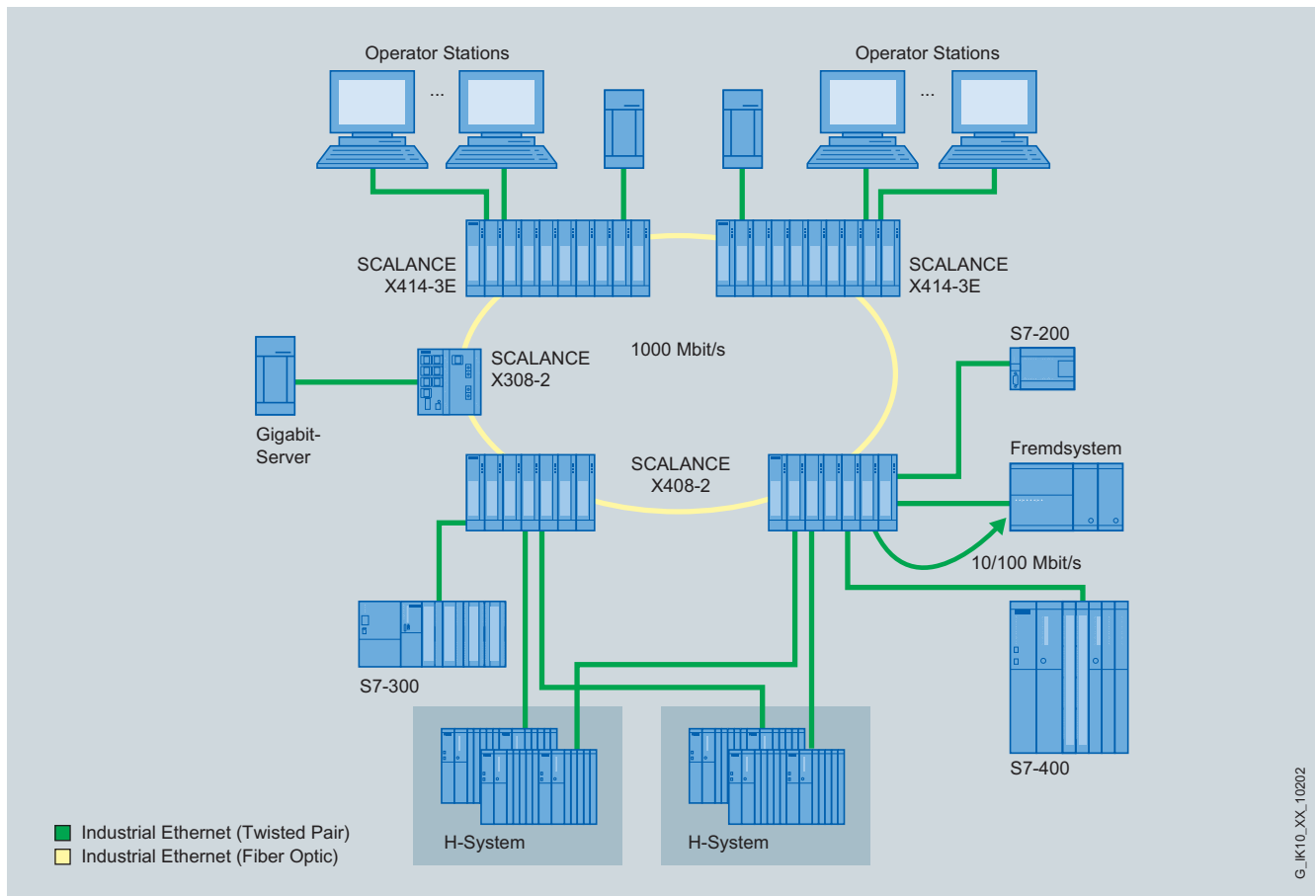
- Password-protected dial-up for "Administrator" (read and write authorization) and "User" (read only)
- Read-out of version and status information
- Setting the signal and standby mask and address information
- Fixed parameterization of the ports (data rates, half/full duplex)
- Setting parameters of the VLANs and multicast services
- Parameterization of the standby connections for a redundant ring link
- Setting of Rapid Spanning Tree parameters
- Parameterization of user administration of SNMP V1, V2c, V3
- Output of statistics information

- Diagnosis of data traffic by means of a parameterizable mirror port with a standard commercial network analyzer
- Loading of new firmware or the configuration data via the network by a TFTP server
- Saving the configuration data or log table via the network on a TFTP server
- Only for SCALANCE X414-3E: Configuration of the IP routing function (static routing, dynamic routing, (OSPF, RIP v1/2) and redundant routing (VRRP))

If faults occur in the network, the SCALANCE X-400 switch can send error messages (traps) to a network management system or also e-mails to a predefined network administrator.

Remote monitoring (RMON) provides the following functions: The SCALANCE X-400 switch can collect statistics information according to the RMON groups 1 through 4. These include, for example, fault statistics that are kept for each port. This information can be read out through Web-based management in the statistics sub-area.

Integration



Fault-tolerant system with SCALANCE X-400

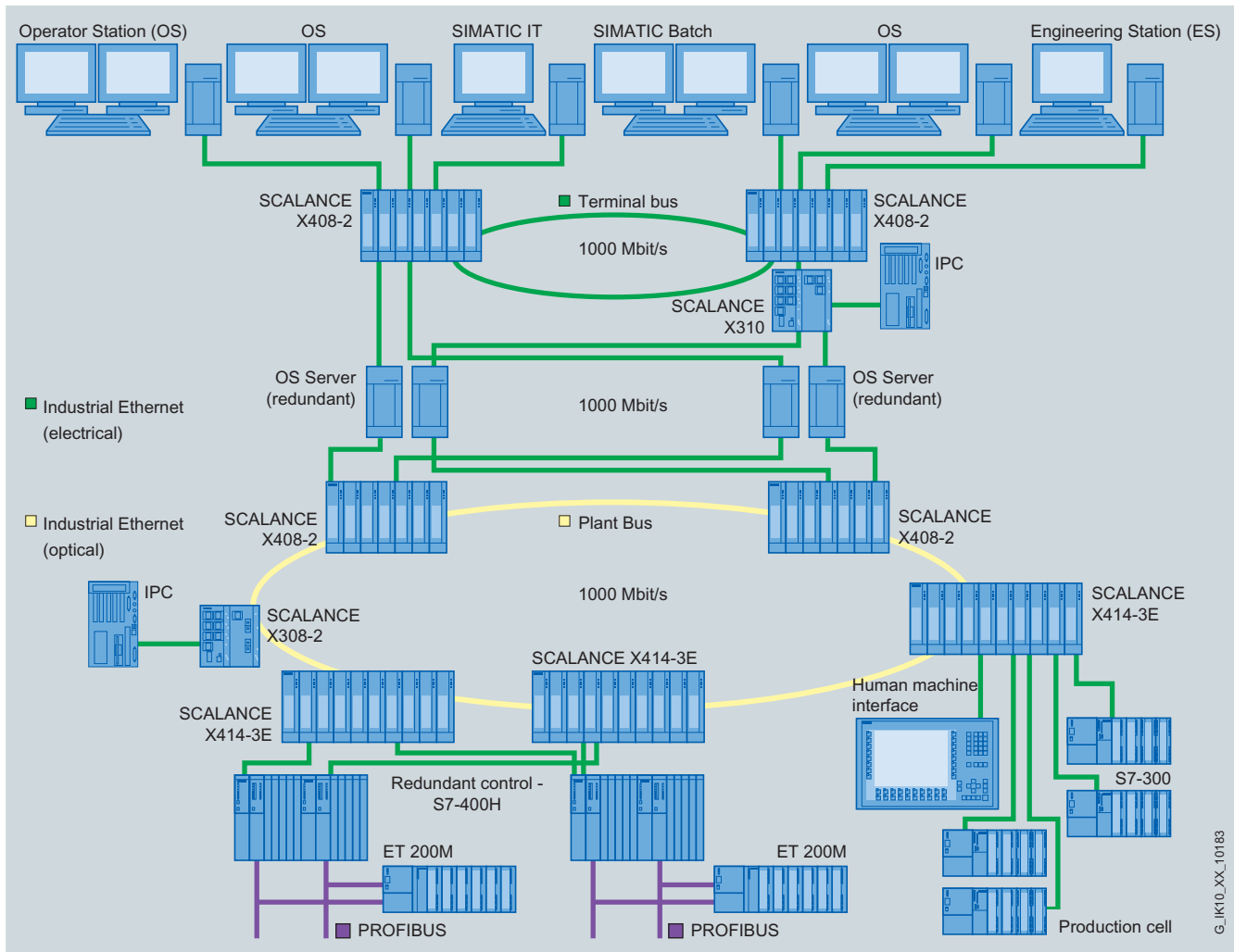
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PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

Integration (continued)



Use of the SCALANCE X-400 switches in a process control system, e.g. PCS 7

In the control room, two SCALANCE X-400 switches are used on the terminal bus. With a higher number of stations, SCALANCE X414-3E switches can be used with extender modules. These are connected together to create an electrical ring with a transfer rate of 1000 Mbit/s. Several operator panels are provided and divided between the two switches, so that the system can still be operated if one switch fails. The terminal and plant buses are connected using redundant servers, and also using high-performance Gigabit plugs in the case of SCALANCE X408-2.

The plant bus is designed as an optical ring. It connects three plant sections with the servers:

- SCALANCE X-400 switches without extenders are used for connecting high-availability SIMATIC controllers (H-systems). On failure of an individual controller or switch, the plant section remains functional.
- One SCALANCE X414-3E with extender (high number of ports) is used for the star-format connection of controllers.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

Technical specifications

Order No.	6GK5 408-2FD00-2AA2	6GK5 414-3FC00-2AA2
Product type description	SCALANCE X408-2	SCALANCE X414-3E
Transfer rate		
• Transfer rate 1	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s
• Transfer rate 3	1 000 Mbit/s	1 000 Mbit/s
Number of electrical connections		
• for digital input signals	-	2
• for media module	2	3
• for signaling contact	1	1
• for network components or terminals	8	14
- with extender modules	-	8
• for redundant voltage supply	1	1
• for voltage supply	1	1
Electrical connection version		
• for digital input signals	-	5-pin terminal block
• for signaling contact	4-pin terminal block	4-pin terminal block
• for network components or terminals	4 x RJ45 (10/100/1000 Mbit/s; TP); 4 x RJ45 (10/100 Mbit/s; TP)	2 x RJ45 (10/100/1000 Mbit/s; TP); 12 x RJ45 (10/100 Mbit/s; TP)
- with extender modules	-	RJ45 (10/100 Mbit/s; TP) via EM495-8
• for voltage supply	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	4	4
• at 1000 Mbit/s	4	2
• with extender modules	-	12
Version of optical port for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	up to 4 x glass FOC 100 Mbit/s via media modules MM491-2, MM491-2LD or MM491-2LH+	up to 4 x glass FOC 100 Mbit/s via media modules MM491-2, MM491-2LD or MM491-2LH+
• at 1000 Mbit/s	up to 4 x glass FOC 1000 Mbit/s via media modules MM492-2/MM492-2LD/ MM492-2LH or MM492-2LH+;	up to 2 x glass FOC 1000 Mbit/s via media modules MM492-2/MM492-2LD/ MM492-2LH or MM492-2LH+;
• with extender modules	-	up to 12 x glass FOC 100 Mbit/s via EM496-4 and MM491-2, MM491-2LD or MM491-2LH+
Number of extender expansion interfaces	-	3
Version of extender expansion interfaces	-	EM495-8 or EM496-4
Number of digital inputs	-	2
Version of the C-PLUG swap medium	Yes	Yes
Type of supply voltage	DC	DC
Supply voltage	24 V	24 V
• external	24 V	24 V
- Maximum	32 V	32 V
- Minimum	18 V	18 V
Current consumed	700 mA	2 000 mA

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

Technical specifications (continued)

Order No.	6GK5 408-2FD00-2AA2	6GK5 414-3FC00-2AA2
Product type description	SCALANCE X408-2	SCALANCE X414-3E
Effective power loss		
• at 24 V DC	15 W (without media modules)	15 W (without media modules)
• Maximum	48 W (maximum configuration)	48 W (maximum configuration)
Ambient temperature		
• during operation	0 ... +60 °C	0 ... +60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%
Width	275 mm	344 mm
Height	145 mm	145 mm
Depth	117 mm	117 mm
Net weight	1 900 g	3 100 g
Type of fixing	DIN rail, S7-300 mounting rail	DIN rail, S7-300 mounting rail
Degree of protection	IP20	IP20
Standard		
• for EMI of FM	FM 3611, FM hazardous location	FM 3611, FM hazardous location
• For Ex zone	EN 50021	EN 50021
• for safety of CSA	-	-
• For emitted interference	EN 61000-6-4 Class A	EN 61000-6-4 Class A
• For noise immunity	EN 61000-6-2	EN 61000-6-2
Directive		
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950-1, CSA C22.2 No. 60950-1, UL 508, CSA C22.2 No. 14-M91 UL 1604 and 2279 (Hazardous Location)	UL 60950-1, CSA C22.2 No. 60950-1, UL 508, CSA C22.2 No. 14-M91 UL 1604 and 2279 (Hazardous Location)
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes
Marine classification association		
• American Bureau of Shipping Europe Ltd. (ABS)	-	Yes
• Bureau Veritas (BV)	-	Yes
• Det Norske Veritas (DNV)	-	Yes
• Germanischer Lloyd (GL)	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes
• Nippon Kaiji Kyokai (NK)	Yes	Yes

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

2

Ordering data

Order No.

Order No.

Industrial Ethernet Switches SCALANCE X-400

Modular Industrial Ethernet switches with integrated RJ45 ports for setting up electrical and/or optical Industrial Ethernet networks; integrated redundancy manager, IT functions (RSTP, VLAN, etc.), PROFINET IO Device, network management via SNMP and web server; incl. operating instructions, Industrial Ethernet network manual and configuration software on CD-ROM; C-PLUG included in the scope of delivery

- **SCALANCE X408-2;**
4 x 10/100/1000 Mbit/s and
4 x 10/100 Mbit/s RJ45 ports;
2 x Gigabit/Fast Ethernet media
module slots
- **SCALANCE X414-3E;**
2 x 10/100/1000 Mbit/s and
12 x 10/100 Mbit/s RJ45 ports;
1 x Gigabit-Ethernet and
2 x Fast Ethernet media module
slots;
1 x extender interface

6GK5 408-2FD00-2AA2

6GK5 414-3FC00-2AA2

MM491/MM492 media modules

Media modules with 2 ports;
1 Gbit/s

MM492-2;
1000BaseSX, SC connection,
multimode FOC up to 750 m

MM492-2LD;
1000BaseLX, SC connection,
single-mode FOC up to 10 km

MM492-2LH;
1000BaseLX, SC connection,
single-mode FOC up to 40 km

MM492-2LH+;
1000BaseLX, SC connection,
single-mode FOC up to 70 km

Media modules with 2 ports;
100 Mbit/s

MM491-2;
100BaseLX, BFOC interface,
multimode FOC up to 3 km

MM491-2LD;
100BaseFX, BFOC interface,
singlemode FOC up to 26 km

MM491-2LH+;
100BaseFX, SC connection,
single-mode FOC up to 70 km

6GK5 492-2AL00-8AA2

6GK5 492-2AM00-8AA2

6GK5 492-2AN00-8AA2

6GK5 492-2AP00-8AA2

6GK5 491-2AB00-8AA2

6GK5 491-2AC00-8AA2

6GK5 491-2AE00-8AA2

EM495/EM496 extender mod- ules

Extender modules for
SCALANCE X414-3E

- **EM495-8;**
with 8 x 10/100 Mbit/s TP ports
- **EM496-4;**
with 4 slots for 100 Mbit/s media
modules

6GK5 495-8BA00-8AA2

6GK5 496-4MA00-8AA2

Accessories

IE FC RJ45 Modular Outlet

FastConnect RJ45 outlet for
Industrial Ethernet with interface
for replaceable insert;

- **With insert 2FE;**
replaceable insert
for 2 x 100 Mbit/s interfaces

6GK1 901-1BE00-0AA1

- **With 1GE insert;**
replaceable insert
for 1 x 1000 Mbit/s interfaces

6GK1 901-1BE00-0AA2

IE FC TP Standard Cable GP 4 x 2

8-core, shielded TP installation
cable for connection to IE
FC RJ45 Modular Outlet for
universal applications; with UL
approval; sold by the meter;
max. quantity 1000 m,
minimum order 20 m

6XV1 870-2E

IE FC RJ45 Plugs

RJ45 plug connector for Industrial
Ethernet with a rugged metal
housing and integrated insulation
displacement contacts for con-
necting Industrial Ethernet FC
installation cables

IE FC RJ45 Plug 180

180° cable outlet; for network
components and CPs/CPU's with
Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

IE FC RJ45 Plug 145

145° cable outlet;
e.g. for SIMOTION and SINAMICS

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB30-0AA0

6GK1 901-1BB30-0AB0

6GK1 901-1BB30-0AE0

IE FC RJ45 Plug 4 x 2

RJ45 plug connector for Industrial
Ethernet (10/100/1000 Mbit/s)
with a rugged metal enclosure
and integrated insulation dis-
placement contacts for connect-
ing Industrial Ethernet FC
installation cables; 180° cable
outlet; for network components
and CPs/CPU's with Industrial
Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB11-2AA0

6GK1 901-1BB11-2AB0

6GK1 901-1BB11-2AE0

C-PLUG

Swap medium for simple replace-
ment of devices in the event of a
fault; for storing configuration or
engineering and application data;
can be used for SIMATIC NET
products with C-PLUG slot

6GK1 900-0AB00

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

SCALANCE X-400

Ordering data**Order No.***Replacement parts***CV490 cover set****6GK5 490-0AA00-0AA2**

consisting of covers for:
 1 x Gbit submodule slot,
 1 x 100 Mbit/s submodule slot,
 3 x 10/100 Mbit/s TP slot

Label sheet**6GK5 498-0AA00-0AA0**

10 sheets DIN A4, color: petrol,
 10 strips/sheet, pre-perforated for
 printing with laser printer
 10 sheets per pack

4-pole and 5-pole terminal set**6GK5 498-1AA00-0AA0**

Straight, with locking lug

SIMATIC NET Manual Collection**6GK1 975-1AA00-3AA0**

Electronic manuals
 for communication systems,
 communication protocols,
 and communication products;
 on DVD;
 German/English

2

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Industrial Ethernet OSM/ESM

Overview



- The managed Industrial Ethernet OSM and ESM switches are used to construct Industrial Ethernet networks at the control level
- The modules are interconnected (backbone) at 100 Mbit/s over
 - Glass fiber-optic cables for OSM
 - Twisted pair cables for ESM
- Connection of data terminals or network segments depending on the OSM/ESM type through
 - 2 to 8 Twisted Pair ports in RJ45 or 9-pole Sub-D version with 10/100 Mbit/s
 - 3 or 8 fiber-optic ports with 100 Mbit/s
- Integrated redundancy manager supports high-speed media redundancy also for large networks
- Very easy network configuration and network extension without complex configuration rules or parameterization
- SNMP and Web-based Management and RMON
- Error signaling by e-mail
- Integration of digital signals, e.g. door switch, temperature monitoring or signaling contacts into the management system by means of digital inputs

Benefits



- Reliable communication due to very fast reconfiguration of the network in event of fault (<0.3 seconds)
- Security of investment for existing networks due to
 - effortless connection of existing 10 Mbit/s data terminals or subnetworks to Fast Ethernet networks with 100 Mbit/s
 - Enhanced performance thanks to load decoupling and a data rate of 100 Mbit/s
- Easy network configuration without runtime calculation also for extremely large networks
- High availability of the network due to:
 - Redundant voltage feed
 - Redundant network structures based on fiber-optic or Twisted Pair cables; redundancy manager and standby function are integrated

- Flexible configuration of networks, the network topology can easily be adapted to the structure of the plant with OSM/ESM modules.
- Simple monitoring and diagnosis by means of signaling contact, digital inputs, SNMP or e-mail
- Low-maintenance operation thanks to fanless construction

Application

The Industrial Ethernet OSM (Optical Switch Module) and ESM (Electrical Switch Module) are used in the construction of switched networks with data transmission rates of 100 Mbit/s in the control level range, in which strict demands are placed on network availability and comprehensive diagnostics are required.

In existing networks, load decoupling and thus increased network performance can be achieved by creating segments (subdividing a network into subnetworks/segments) and connecting these segments to an OSM/ESM.

The redundancy manager integrated into OSM/ESM allows redundant Industrial Ethernet rings to be constructed in switching technology with high-speed media redundancy (reconfiguration time 0.3 seconds max.).

The data transmission rate in the ring is 100 Mbit/s; for each ring, up to 50 Industrial Ethernet OSMs (optical ring) or ESMs (electrical ring) can be used. Apart from the 2 ring ports, OSM/ESM has other ports (with either RJ45, ITP or BFOC interfaces) to which data terminals or network segments can be connected.

With Industrial Ethernet OSM BC08 and media converters Industrial Ethernet OMC TP11, "Fiber to the machine" concepts can be implemented, so that the advantages of optical transmission technology can be utilized both for the backbone area and for station connection:

- High-speed station connection (100 Mbit/s Full Duplex) over Industrial Ethernet OSM BC08 and media converter Industrial Ethernet OMC TP11 (fiber-optic cable through to the control cabinet) in an environment subjected to strong electromagnetic fields
- Bridging of large distances of up to 3 km between two OSM BC08 modules or from an OSM BC08 to a distant station
- Equipotential bonding measures or lightning protection measures are not necessary thanks to fiber-optic cables.

Industrial Ethernet OSM TP22 or ESM TP40 modules are ideal for installation in the control cabinet with 1 or 2 stations connected (low equipment density).

With Industrial Ethernet OSM/ESM (devices with 8 ports), several rings can be redundantly interconnected using the integrated standby function.

Apart from the 2 ring ports, Industrial Ethernet OSM/ESM modules are equipped with other ports to which both data terminals and network segments can be connected.

OSM/ESM offer the following three error signaling functions:

- Over a signaling contact
- Over SNMP (traps)
- by e-mail

Signals such as signaling contacts from PROFIBUS OLM or door contacts can be connected to Industrial Ethernet OSM/ESM through digital inputs. These digital inputs can be monitored using network management functions (read out status, e-mail on status change, create trap or log table entry).

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Industrial Ethernet OSM/ESM

Design

OSM/ESM have a stable metal casing. They are suitable for the following installation types:

- Standard rail
- Wall mounting
- Mounting in 19-inch racks (when 2 modules are used)

All modules have

- a 6-pole terminal block for connecting the supply voltage (redundant 24 V DC infeed) and the floating signaling contact as well as
- one or two 6-pole terminal blocks for connecting four digital inputs in each case

The operating mode and status information are displayed by LEDs and a selection button.

Modules with 8 ports also have a standby interface that is used to synchronize two modules when coupling redundant rings.

Using the serial interface, Industrial Ethernet OSM/ESM can be parameterized, diagnosed or upgraded to the latest firmware status. The firmware can also be upgraded over the network.

Industrial Ethernet OSM/ESM is available with 4 or 8 ports. They are equipped with the following types of ports depending on the variant:

- *Twisted Pair interface (RJ45); 10/100BaseTX* : RJ45 socket, automatic data rate detection (10 or 100 Mbit/s) as well as automatic cross-over of the send/receive cables for connecting FC cables in the field to IE FC RJ45 Plug 180 of up to 100 m in length or TP Cords (max. length 10 m, in combination with IE FC Outlet RJ45s and IE FC cables up to 100 m)
- *Twisted Pair interface (Sub-D); 10/100BaseTX*: 9-pole Sub-D socket, automatic data rate detection (10 or 100 Mbit/s) as well as automatic cross-over of the send/receive circuits for connecting ITP cables (max. length 100 m) with Sub-D connectors
- *Glass FOC: Multimode (MM); 100BaseFX BFOC*: 2 BFOC sockets per port, 100 Mbit/s data transmission rate, for connecting multimode fiber-optic cables in environments subjected to strong electro-magnetic fields and for distances of up to 3000 m between two Industrial Ethernet OSMs
- *Glass FOC: Singlemode (SM); 100BaseFX BFOC*: 2 BFOC sockets per port, 100 Mbit/s data transmission rate, for connecting singlemode fiber-optic cables in environments subjected to strong electro-magnetic fields and for distances of up to 26 km between two Industrial Ethernet OSM ITP62-LD modules.

Function

Increase in network performance

By filtering the data traffic based on the Ethernet (MAC) address of the data terminals, local data traffic remains local, only data intended for nodes in another subnet is forwarded by the OSM or ESM.

Simple network configuration and network expansion

The overall extent of the network can be up to 150 km with OSM or up to 5 km with ESM. The OSM/ESM saves the data received at the ports and forwards it independently to the destination address. Collision detection (CSMA/CD method) does not restrict the expansion of the network beyond the switch port.

Limiting error propagation to the subnet concerned

The OSM/ESM only forwards valid data.

Integration of existing subnets at 10 Mbit/s into Fast Ethernet networks at 100 Mbit/s

The OSM/ESM automatically detects the data rate (10 or 100 Mbit/s) at the twistedpair ports as well full or half duplex mode.

Fast redundancy in the ring (reconfiguration time of the ring max. 0.3 seconds):

The availability of the communication is increased by closing an optical line with OSM or an electrical line with ESM to form a ring. OSM/ESM have an integral redundancy manager which continuously monitors the function of the network. It recognizes the failure of a section in the ring or of an OSM/ESM and activates the substitute path within a maximum of 0.3 seconds.

High-speed stand-by redundancy

Several redundant rings can be reliably interconnected using the integrated standby function (in the case of OSM/ESM with 8 ports). Two OSMs/ESMs of one ring, linked by means of a standby connection, are connected to the other ring by means of two connecting routes.

Digital Inputs

Easy integration of digital signals into the SNMP-based network management.

Autocrossover function at RJ45 ports

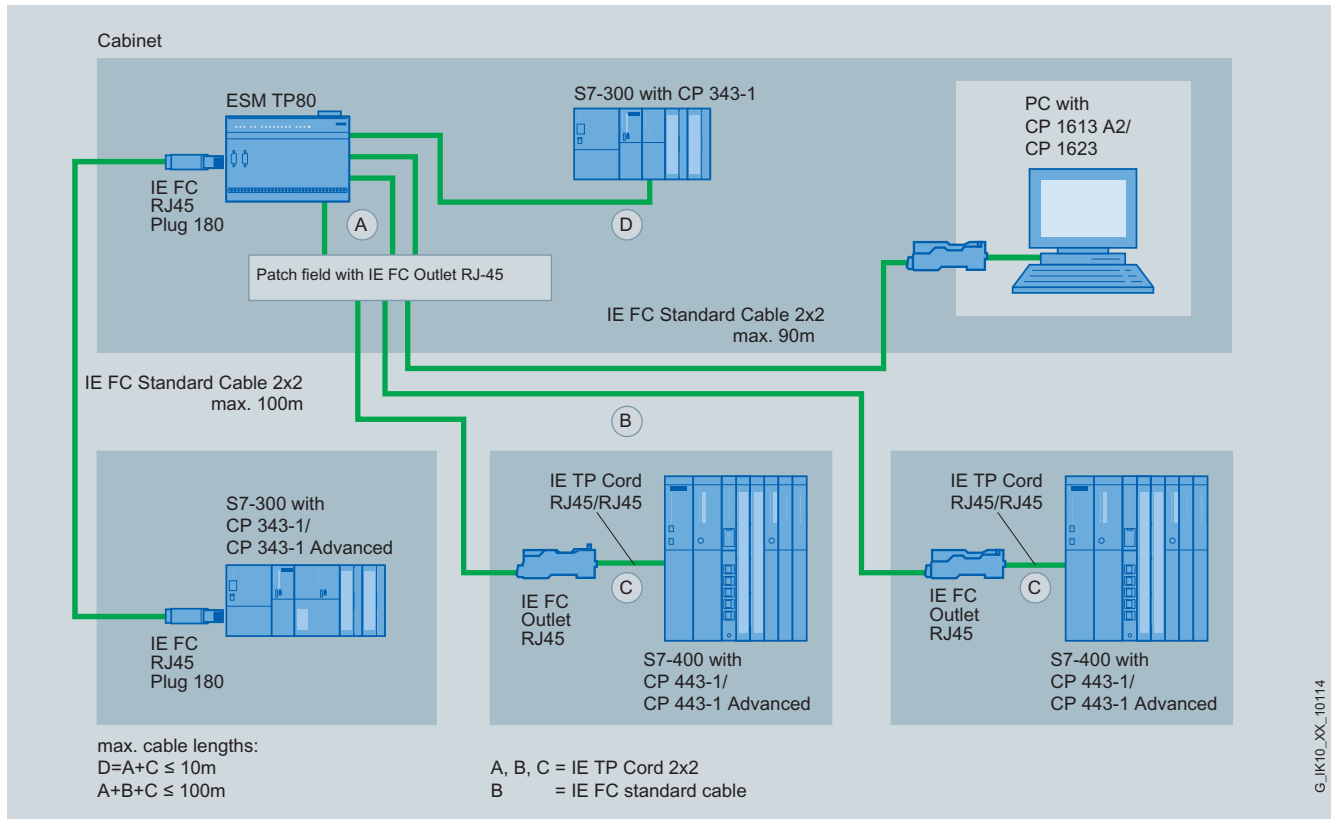
If necessary, the Industrial Ethernet OSM/ESM TP ports automatically cross over the send/receive lines to the connected partner device at RJ45 ports. This means that crossover TP XP cords are not required. A condition of the auto-crossover function is that auto-negotiation is activated.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Industrial Ethernet OSM/ESM

Function (continued)



Example of a device connection with ESM

Network topology and network configuration

The network topology can easily be adapted to the structure of the plant with OSM/ESM.

The following network structures and combinations of structures can be implemented:

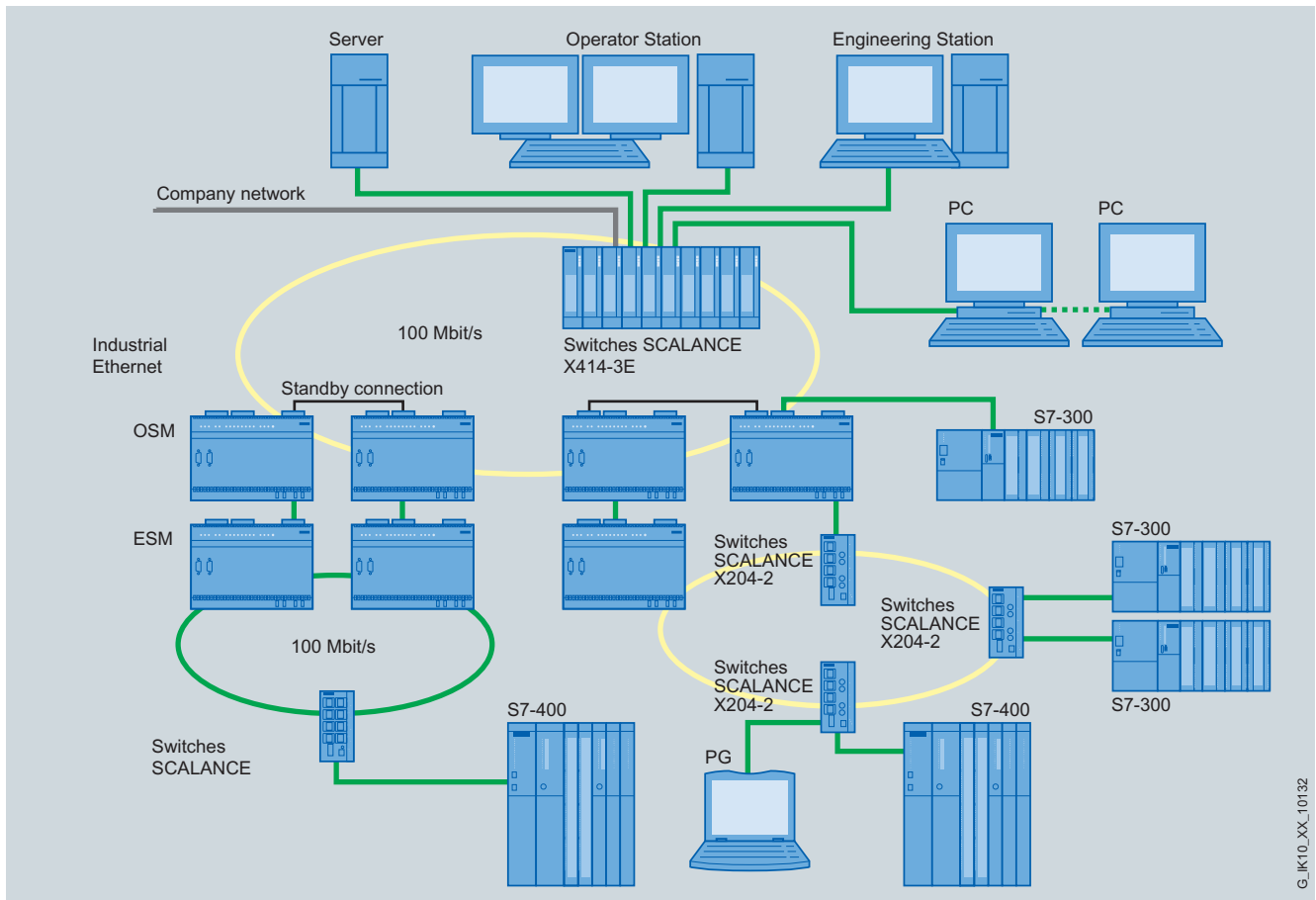
- Optical line and star structure with OSM, SCALANCE X204-2 or SCALANCE X414-3E and fiber-optic cable media module 100 Mbit/s:
The cascading depth and network expansion are limited only by the signal delay; the overall network may extend up to 150 km.
- Electrical line and star structure with ESM, SCALANCE X208 or SCALANCE X414-3E:
The cascading depth and network expansion are limited only by the signal delay; the overall network may extend up to 5 km.
- Structuring of existing networks by connecting individual sub-networks to OSM/ESM
- Optical 100 Mbit/s rings with high-speed media redundancy (up to 50 Industrial Ethernet OSMs, SCALANCE X204-2 or SCALANCE X414-3E per ring; maximum reconfiguration time: 0.3 seconds)
- Electrical 100 Mbit/s rings with high-speed media redundancy (up to 50 ESMs, SCALANCE X208 or SCALANCE X414-3E per ring; maximum reconfiguration time: 0.3 seconds)
- Hierarchical redundant rings:
Individual redundant rings (10 Mbit/s or 100 Mbit/s) are connected over two OSMs or ESMs to a higher-level 100 Mbit/s ring. High-speed media redundancy can be implemented for the individual rings and for their redundant connection.

When configuring the network, it is necessary to observe the following boundary conditions:

- Maximum length of fiber-optic cable between two modules: 3000 m with multimode fiber-optic cable
- Maximum length of fiber-optic cable between two Industrial Ethernet OSM ITP62-LD modules: 26 km with singlemode fiber-optic cable
- Maximum length of the TP cord: 10 m; together with RJ45 outlets and FC cables up to 100 m
- Maximum length of the ITP cable with Sub-D connectors between two modules or to the station: 100 m.
- Maximum length of the IE FC cable 2 x 2 with IE FC RJ45 Plug 180 between two modules or to the station: 100 m

Network configuration rules such as "delay equivalent" and "variability value" end at the port of the switch and are meaningless for the cascading of switches.

Function (continued)



Optical and electrical ring, redundantly coupled

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Industrial Ethernet OSM/ESM

Function (continued)

Commissioning and diagnosis

OSM/ESM have the following adjustment options on the device itself:

- Redundancy manager (RM)
- When setting up a ring, one module in the ring is switched to RM mode by means of a switch.
- The non-ring ports of the RM can be used for the connection of data terminals and networks.
- Standby function (for OSM/ESM with 8 ports)
- When coupling rings redundantly, one module in the ring that is connected to the neighboring module by means of a standby connection is switched to the standby mode.
- Signal mask;
the signal mask is set to the current (target) status of the module by pushbutton operation. The signal mask defines which ports and which power supplies are to be monitored. The signaling contact only reports an error when a monitored port or a monitored feeder fails (deviation of setpoint/actual status).

OSMs/ESMs have the following diagnostic options:

- The following status information is displayed by LEDs on site:
 - RM mode
 - Standby mode (for OSM/ESM with 8 ports)
 - Signaling contact status
 - Status of the two power supplies
 - Port status
 - Port mode (10/100 Mbit/s, full/half-duplex)
 - Signal mask (setpoint status)
 - Status of the digital Inputs
- The status of the signaling contact is routed externally by means of floating relay contacts. This enables the module to be monitored via an input module from a controller.

In addition, Industrial Ethernet OSMs/ESMs can be monitored by means of network management. The following interfaces are offered for this purpose:

- Locally on the module;
over the serial interface and PC with terminal emulation per command line (CLI – Command Line Interface)
- Remote via browser (Web-based management):
Selection of OSM/ESM via the network from a PC with browser
- Remote via SNMP;
Integration of OSM/ESM via the network into a network management station

Network management

Network management provides the following functions:

- Password-protected dial-up for "Administrator" (read and write authorization) and "User" (read only)
- Read-out of version and status information
- Setting the signal and standby mask and address information
- Fixed parameterization of the ports and filter tables (filter tables only in the case of OSMs/ESMs with 8 ports)
- Output of statistical information
- Diagnosis of data traffic by means of a parameterizable mirror port with a standard commercial network analyzer
- Loading of new firmware or the configuration data via the network by a TFTP server
- Saving the configuration data or log table via the network on a TFTP server

If problems occur in the network, the OSM/ESM can send error messages (traps) automatically to a network management system or Emails to a network administrator.

The remote monitoring (RMON) in the case of OSM/ESM with 8 ports offers the following functions:
The OSM/ESM can collect statistics information according to the RMON groups 1 through 3. These include, for example, fault statistics that are kept for each port.

This information can be read out from the OSM/ESM through Web-based management in the statistics sub-area.

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Industrial Ethernet OSM/ESM

Technical specifications

Order No.	6GK1 105-.....
Product type description	Industrial Ethernet OSM/ESM
Transfer rate	
• Transfer rate 1	10 Mbit/s
• Transfer rate 2	100 Mbit/s
Number of electrical connections	
• for digital input signals	2
• for signaling contact	1
• for network components or terminals	6
- with autocrossover	6
• for redundant voltage supply	1
• for voltage supply	-
Electrical connection version	
• for digital input signals	6-pin plug-in terminal block
• for network components or terminals	9-pin Sub-D socket (10/100 Mbit/s)
• for power supply and signaling contact	1 x 6-pin plug-in terminal block
Number of optical ports for fiber-optic cables	
• at 10 Mbit/s	-
• at 100 Mbit/s	2
Version of optical port for fiber-optic cables	
• at 10 Mbit/s	-
• at 100 Mbit/s	BFOC sockets (multimode, 100 Mbit/s)
Number of digital inputs	8
Version of the C-PLUG swap medium	No
Type of supply voltage	DC
Supply voltage	24 V
• external	24 V
- Maximum	32 V
- Minimum	18 V
• Maximum	32 V
• Minimum	18 V
Signal voltage	
• for signal <0> in case of DC	
- Maximum	3 V
- Minimum	-30 V
- Rated value	24 V
• for signal <1> in case of DC	
- Maximum	30 V
- Minimum	13 V
- Rated value	24 V
current consumed at rated value of supply voltage	1000 mA

Order No.	6GK1 105-.....
Product type description	Industrial Ethernet OSM/ESM
Effective power loss	
• at 24 V DC	20 W
• Maximum	-
Input current	
• at digital input on signal <0> max.	8 mA
• on signal <1>	8 mA
Ambient temperature	
• during operation, max. Comments	for OSM ITP62-LD: +55 °C
• during operation	0 ... 60 °C
• during storage	-20 ... +80 °C
• during transport	-20 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%
Width	217 mm
Height	156,5 mm
Depth	69 mm
Net weight	1400 g
Type of fixing	DIN rail, fixed mounting, 19" installation (in pairs)
Degree of protection	IP20
Standard	
• for EMI of FM	Class 1, Division 2, Group A, B, C, D
• For Ex zone	-
• for safety of CSA	CSA C22.2 No. 950
• For emitted interference	EN 50081-2
• For noise immunity	EN 50082-2
Directive	
• for C-Tick	AS/NZS 2064 (Class A)
• for safety of UL	UL 1950
Certificate of suitability	Use in industrial area
• CE label	Yes
• e-symbol	-
Marine classification association	
• American Bureau of Shipping Europe Ltd. (ABS)	Yes
• Bureau Veritas (BV)	Yes
• Det Norske Veritas (DNV)	Yes
• Europe Ltd. (ABS)	Yes
• Germanischer Lloyd (GL)	Yes
• Lloyds Register of Shipping (LRS)	Yes
• Nippon Kaiji Kyokai (NK)	Yes
Cascading in case of redundant ring with reconfiguration time of < 0.3 s	50
Cascading in case of star structure	Any (depending only on signal propagation time)

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Industrial Ethernet OSM/ESM

2

Ordering data	Order No.		Order No.
Industrial Ethernet OSM ITP62 Optical switch module with 2 fiber-optic ports 100 Mbit/s, 6 ITP ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-2AA10	Industrial Ethernet ESM TP80 Electrical switch module with 8 RJ45 ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-3AB10
Industrial Ethernet OSM TP62 Optical switch module with 2 fiber-optic ports 100 Mbit/s, 6 RJ45 ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-2AB10	Industrial Ethernet ESM TP40 Electrical switch module with 4 RJ45 ports 10/100 Mbit/s and 4 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-3AC00
Industrial Ethernet OSM ITP62-LD Optical switch module with 2 fiber-optic ports 100 Mbit/s long distance (single-mode fiber-optic cable up to 26 km), 6 ITP ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-2AC10	IE FC RJ45 outlet For connecting Industrial Ethernet FC cables and TP Cords; block pricing for quantities of more than 10 or 50 units	6GK1 901-1FC00 0AA0
Industrial Ethernet OSM ITP53 Optical switch module with 3 fiber-optic ports 100 Mbit/s, 5 ITP ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-2AD10	IE FC RJ45 Plug 180 RJ45 cable connector for Indus- trial Ethernet with rugged metal housing and integrated insulation displacement contacts for con- nection of the Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0
Industrial Ethernet OSM TP22 Optical switch module with 2 fiber-optic ports 100 Mbit/s, 2 RJ45 ports 10/100 Mbit/s and 4 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-2AE00	ITP XP Standard Cable 9/9 ITP installation cable with two 9-pin Sub-D connectors for synchronizing two ESMs via the standby port with redundant coupling of subnets	6XV1 850-0CH20 6XV1 850-0CH50 6XV1 850-0CH80 6XV1 850-0CN12 6XV1 850-0CN15 6XV1 850-0CN20 6XV1 850-0CN30 6XV1 850-0CN40
Industrial Ethernet OSM BC08 Optical switch module with 8 fiber-optic ports 100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-4AA00		
Industrial Ethernet ESM ITP80 Electrical switch module with 8 ITP ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management	6GK1 105-3AA10		

PROFINET/Industrial Ethernet

Industrial Ethernet Switches

Industrial Ethernet SIPLUS OSM/ESM

Overview



- The managed Industrial Ethernet OSM and ESM switches are used to construct Industrial Ethernet networks at the control level
- The modules are interconnected (backbone) at 100 Mbit/s over
 - Glass fiber-optic cables (FO) for OSM
 - Twisted Pair cables for ESM
- Connection of data terminals or network segments depending on the OSM/ESM type through
 - 2 to 8 Twisted Pair ports in RJ45 or 9-pole Sub-D design for 10/100 Mbit/s
 - 3 or 8 fiber-optic ports for 100 Mbit/s
- Integrated redundancy manager supports high-speed media redundancy also for large networks
- Very easy network configuration and network extension without complex configuration rules or parameterization
- SNMP, Web-based Management and RMON
- Error signaling by e-mail
- Integration of digital signals, e.g. door switch, temperature monitoring or signaling contacts into the management system by means of digital inputs

Order No.	6AG1 105-2AA10-4AA0	6AG1 105-2AB10-4AA0	6AG1 105-3AA10-4AA0
Order No. based on	6GK1 105-2AA10	6GK1 105-2AB10	6GK1 105-3AA10
Product type description	Industrial Ethernet SIPLUS OSM ITP62	Industrial Ethernet SIPLUS OSM ITP62	Industrial Ethernet SIPLUS ESM ITP80
Environmental conditions	Suited for exceptional medial load (e.g. by chlorine sulfur atmosphere)		
Technical specifications	The technical specifications are identical with those of the based-on modules.		

Additional information can be found in the Internet under:
<http://www.siemens.com/siplus-techdocu>

Ordering data

Order No.

Industrial Ethernet SIPLUS OSM ITP62

(medial load)
 Optical Switch Module with 2 fiber-optic ports 100 Mbit/s, 6 ITP ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management

6AG1 105-2AA10-4AA0

Industrial Ethernet SIPLUS OSM TP62

(medial load)
 Optical Switch Module with 2 fiber-optic ports 100 Mbit/s, 6 RJ45 ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management

6AG1 105-2AB10-4AA0

Industrial Ethernet SIPLUS ESM ITP80

(medial load)
 Electrical Switch Module with 8 ITP ports 10/100 Mbit/s and 8 digital inputs; redundant 24 V DC supply and signaling contact; with network management

6AG1 105-3AA10-4AA0

Accessories

see Industrial Ethernet OSM/ESM ordering data

PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Overview

2



- The unmanaged Industrial Ethernet media converters of the SCALANCE X-100 product line are ideally suited for implementing various transmission media in Industrial Ethernet networks operating at 10/100 Mbit/s in a line, star and ring topology
- Electrical or optical connection to stations or network in accordance with the port type of the devices
- Rugged metal housing for space-saving cubicle mounting on standard rails, S7-300 DIN rail or for wall mounting
- Rugged, industry-standard station connections with PROFINET-compatible RJ45 connectors that offer additional strain relief and bending strain relief thanks to latching on the housing
- Redundant power supply
- Diagnostics on the device by means of LEDs (power, link status, data communication)
- Error signaling contact with easy adjustment using the SET button
- Connection of existing 10 Mbit/s fiber optic networks
- Connection of existing 10Base5 networks (e.g. SINEC H1)

Benefits



- Ideal solution for converting various transmission media in Industrial Ethernet line, star and ring topologies
- Space-saving installation in the cabinet thanks to the compact design in S7-300 format
- Secure data communication by means of industry-standard device interface using PROFINET-compliant plug-in connector IE FC RJ45 Plug and additional strain relief by latching the connector to the housing
- Integration of existing 10Base FL and/or 10Base5 networks
- Cost savings, since installation is possible without a patch field by means of IE FC RJ45 Plug and IE FC Standard Cable
- Simple and fast diagnostics via LED on device and signaling contact
- Uncrossed connecting cables can be used due to the integrated Autocrossover function
- Simple network configuration without runtime calculation

Application

The unmanaged media converters of the SCALANCE X-100 product line permit low-cost conversion of various transmission media within Industrial Ethernet line, star and ring topologies. They are designed for installation in the control cabinet.

Single, remote terminal units on network segments can be linked via the optical path of the SCALANCE X-100 media converters. Integration of an optical path into a redundant ring is also possible, as well as installation of the SCALANCE X-100 media converters into a standby link.

Product versions

SCALANCE X101-1, SCALANCE X101-1LD, SCALANCE X101-1POF, SCALANCE X101-1FL and SCALANCE X101-1AUI

- For converting electrical signals into optical signals in Industrial Ethernet line, star and ring topologies
- The Industrial Ethernet media converters have an electrical 10/100 Mbit/s RJ45 port and:
 - SCALANCE X101-1
a 100 Mbit/s multimode interface with BFOC connections
 - SCALANCE X101-1LD
a 100 Mbit/s single mode interface with BFOC connections
 - SCALANCE X101-1POF
a 100 Mbit/s plastic optical fiber interface with SC-RJ connections
 - SCALANCE X101-1AUI
a 10 Mbit/s AUI interface with SUB-D connections
 - SCALANCE X101-1FL
a 10 Mbit/s multimode interface with BFOC connections
- Redundant power supply with 2 x 24 V DC
- Device diagnostics on the device by means of LEDs (power, link status, data communication) and signaling contact (signaling mask can be set on site using buttons)
- The electric RJ45 socket is industry-standard and features additional retaining collars for connection to the IE FC RJ45 Plugs

PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Design

The SCALANCE Industrial Ethernet media converters with a rugged metal housing are optimized for mounting on a standard rail and an S7-300 DIN rail. Direct wall mounting in various positions is also possible. Due to the housing dimensions that correspond to those of the S7-300, the devices are ideally suited for integration into an automation solution using S7-300 components.

The SCALANCE X-100 media converters feature:

- a 4-pin terminal block for connecting the redundant power supply (2 x 24 V DC)
- a row of LEDs for displaying status information (power, link status, data communication, signaling contact)
- a 2-pole terminal block for connecting the floating signaling contact
- a SET button for local configuration of the signaling contact and of cascading mode

The following port types are available:

- **10/100BaseTX, RJ45 connector:**
RJ45 connector, automatic detection of the data rate (10 or 100 Mbit/s), with Autosensing and Autocrossover function for connecting IE FC cables via IE FC RJ45 Plugs over distances up to 100 m
- **100BaseFX, BFOC connections** with glass fiber optic cable: BFOC sockets for direct connection to Industrial Ethernet glass fiber-optic cables up to 3000 m or 26000 m for configuring line, star or ring topologies.
- **100BaseFX, SC RJ connections** with plastic fiber optic cable: SC RJ sockets for direct connection to Industrial Ethernet POF fiber-optic cables up to 50 m or to Industrial Ethernet PCF fiber-optic cables up to 100 m for configuring line, star or ring topologies
- **10BaseFL, BFOC connections** with glass fiber optic cable: BFOC sockets for direct connection to Industrial Ethernet glass fiber-optic cables up to 3000 m for configuring line, star or ring topologies.
- **AUI, 15-pin Sub-D connector:**
15-pin Sub-D socket for connecting an Industrial Ethernet AUI cable (connecting cable 727-1/drop cable) of up to 50 m to AUI Transceiver (no terminal equipment).

Function

- Configuring electrical and optical Industrial Ethernet line, star or ring topologies
- Uncrossed connecting cables can be used due to Autocrossover function integrated in the TP ports
- Easy configuration and extension of the network; no limits to network extension when switches or media converters of the SCALANCE X-100 family are cascaded.
- Integration of existing 10Base FL and/or 10Base5 networks

	Type and number of ports						Characteristics						
	Twisted Pair	Fiber Optic					Compact enclosure	LED diagnostics	SIMATIC environment	2 x 24 V DC	Signaling contact	On-site display (SET button)	Ring redundancy without RM
		Fast Ethernet											
	10 / 100 Mbit/s	100 Mbit/s			10 Mbit/s								
	RJ45	POF / PCF	Multimode BFOC	Singlemode BFOC	AUI	Multimode BFOC							
SCALANCE X101-1	1		1				•	•	•	•	•	•	•
SCALANCE X101-1LD	1			1			•	•	•	•	•	•	•
SCALANCE X101-1POF	1	1					•	•	•	•	•	•	•
SCALANCE X101-1AUI	1				1		•	•	•	•	•	•	•
SCALANCE X101-1FL	1					1	•	•	•	•	•	•	•
OMC TP11	1		1				•	•	•	•	•		•
OMC TP11LD	1			1			•	•	•	•	•		•

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Function overview of Industrial Ethernet media converters

PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Function (continued)

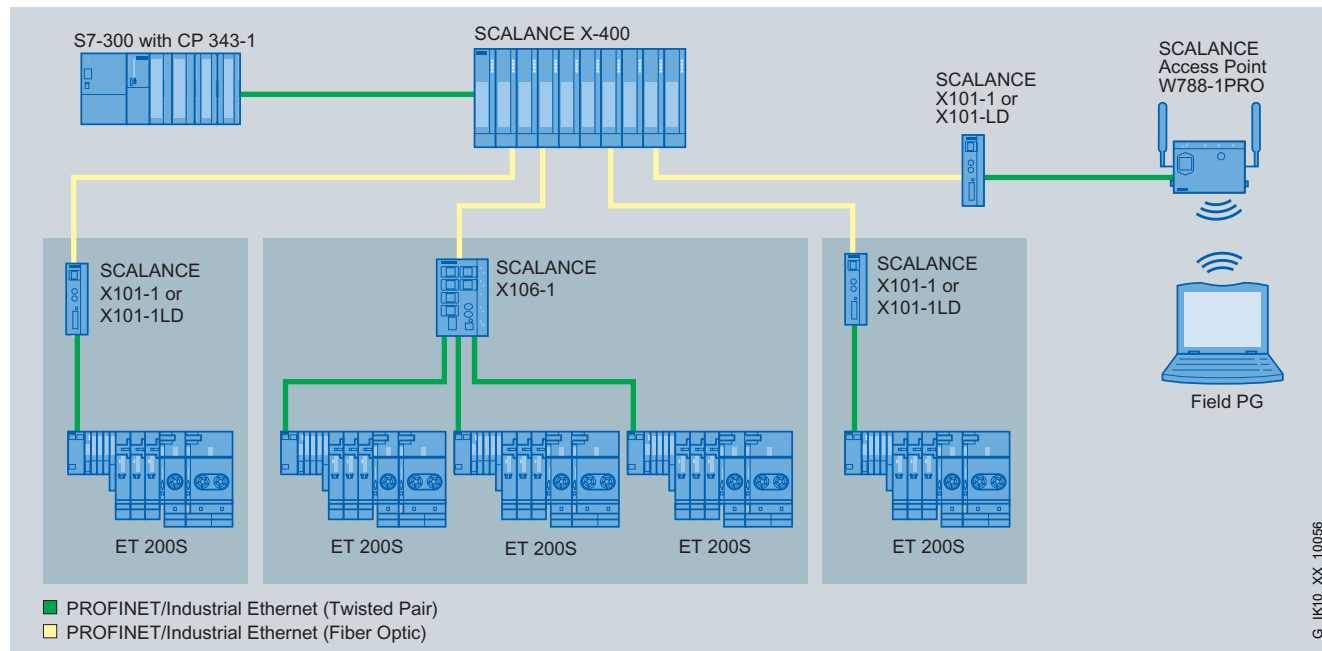
Network topology and network configuration

The SCALANCE X-100 media converters are typically accommodated in one control cabinet together with the nodes to be connected. They can be installed in line, star and ring topologies.

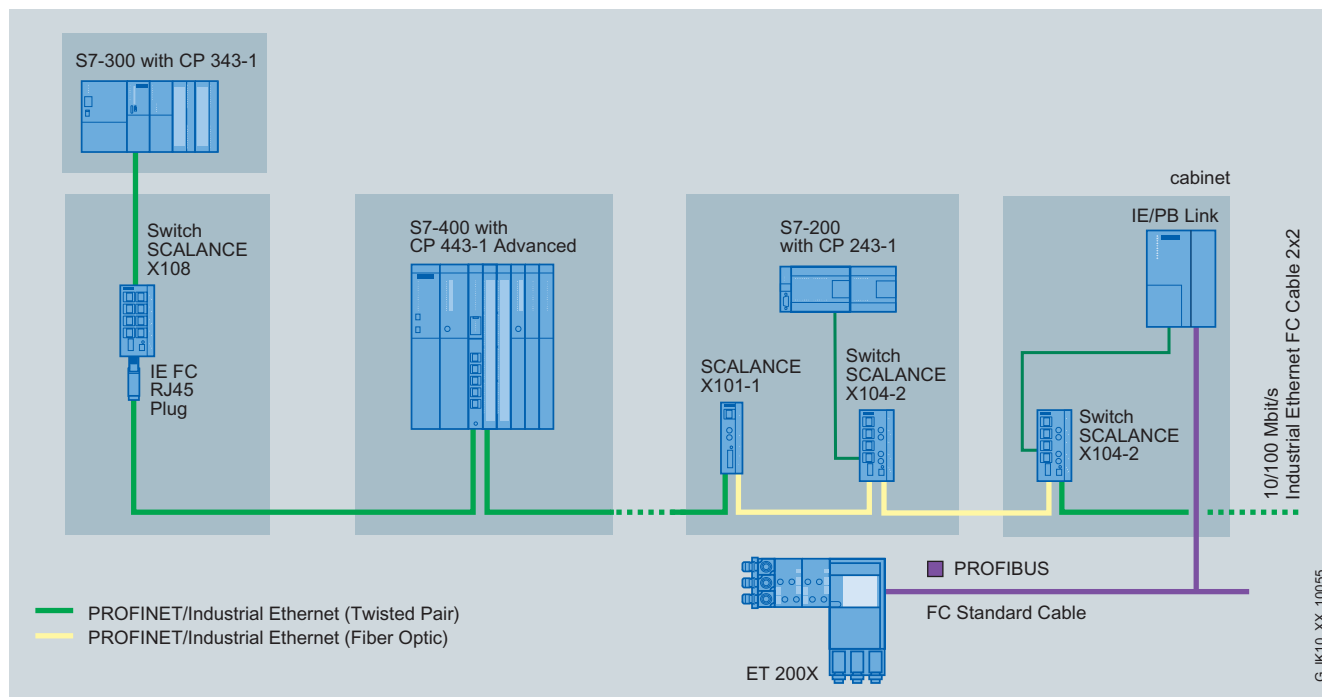
When configuring the network, it is necessary to observe the following boundary conditions:

- Length of the TP cable between two SCALANCE X media converters:
 - Max. 100 m with Industrial Ethernet FastConnect products

- Length of the optical cables:
 - Max. 3000 m with Industrial Ethernet multimode fiber-optic cables.
 - Max. 26000 m with Industrial Ethernet singlemode fiber-optic cables.
 - Max. 100 m with Industrial Ethernet PCF fiber-optic cables
 - Max. 50 m with Industrial Ethernet POF fiber-optic cables
- Length of the AUI cable:
 - max. 50 m with Industrial Ethernet connecting cable 727-1 (AUI drop cable)



Optical star topology with SCALANCE X101-1/X101-1LD and remote SCALANCE W Access Point



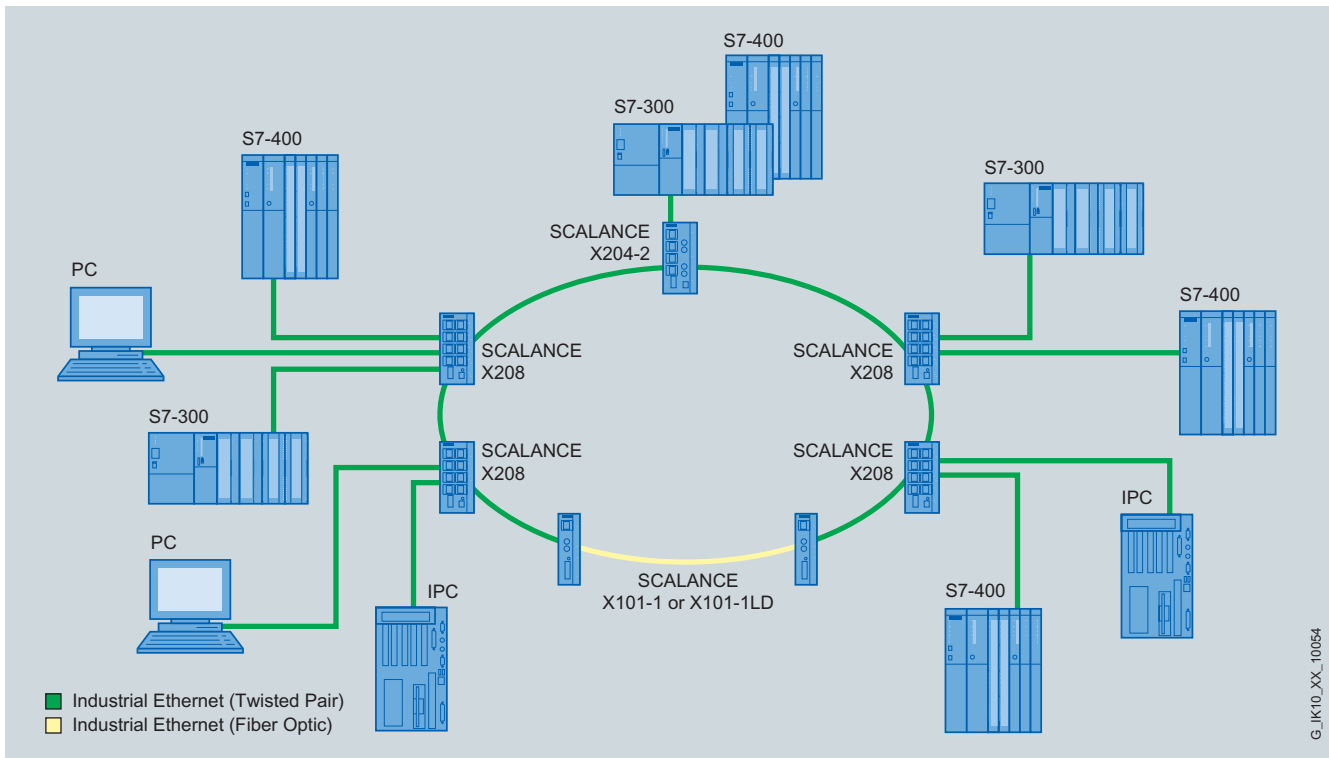
Electrical and optical linear topology with SCALANCE X101-1

PROFINET/Industrial Ethernet

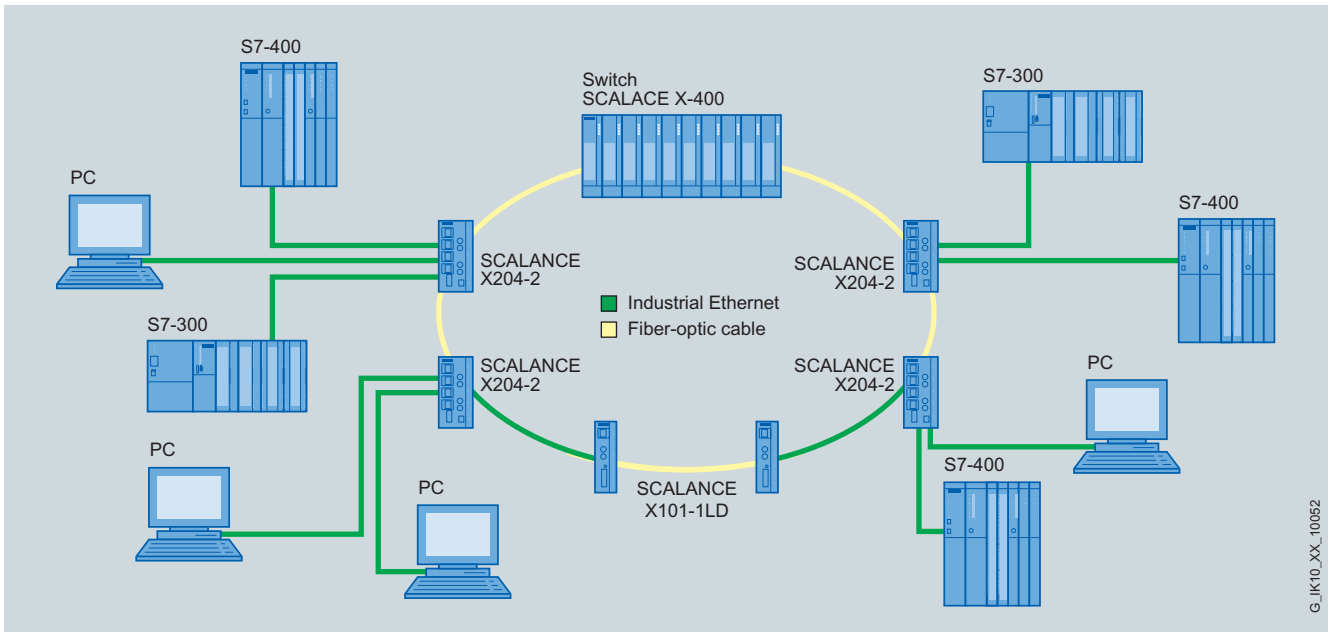
Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Function (continued)



Mixed ring topology with twisted-pair and fiber optic cables



Mixed ring topology with fiber optic and twisted-pair cables

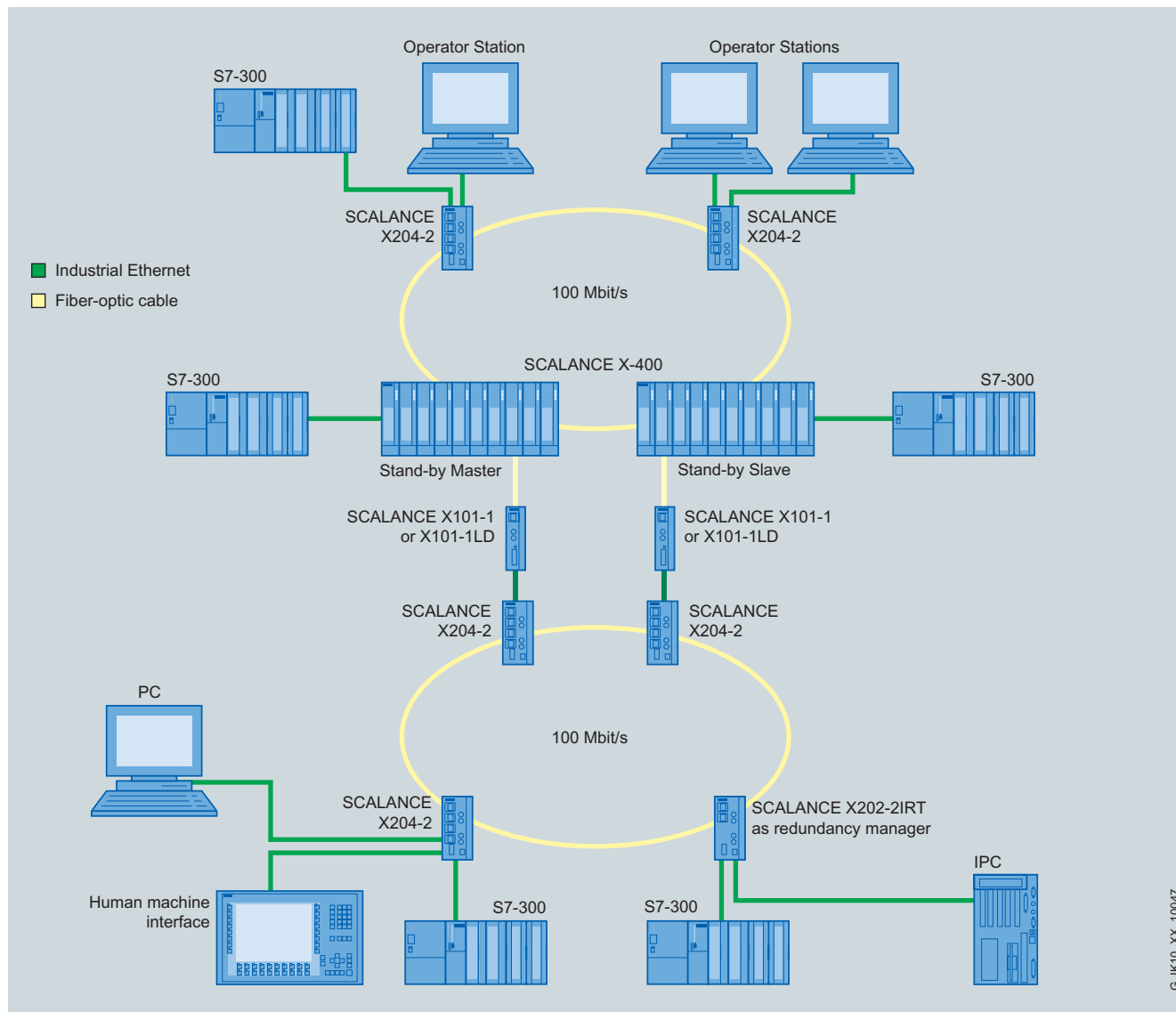
PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

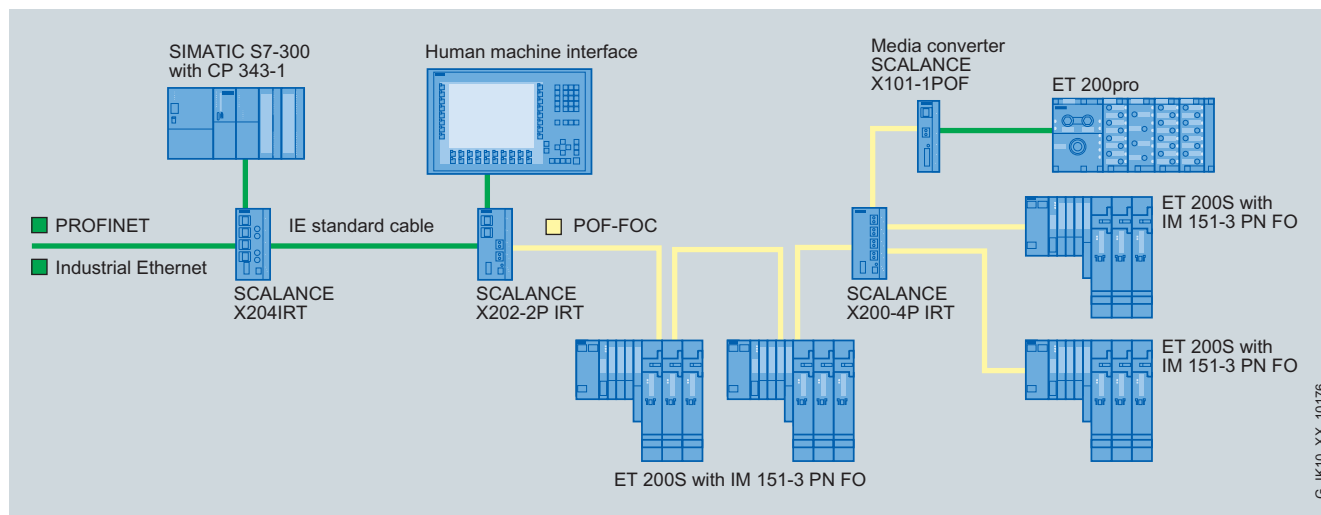
SCALANCE X-100 unmanaged media converter

Function (continued)

2



Optical redundant connection of two optical rings with SCALANCE X101-1 or SCALANCE X101-1LD



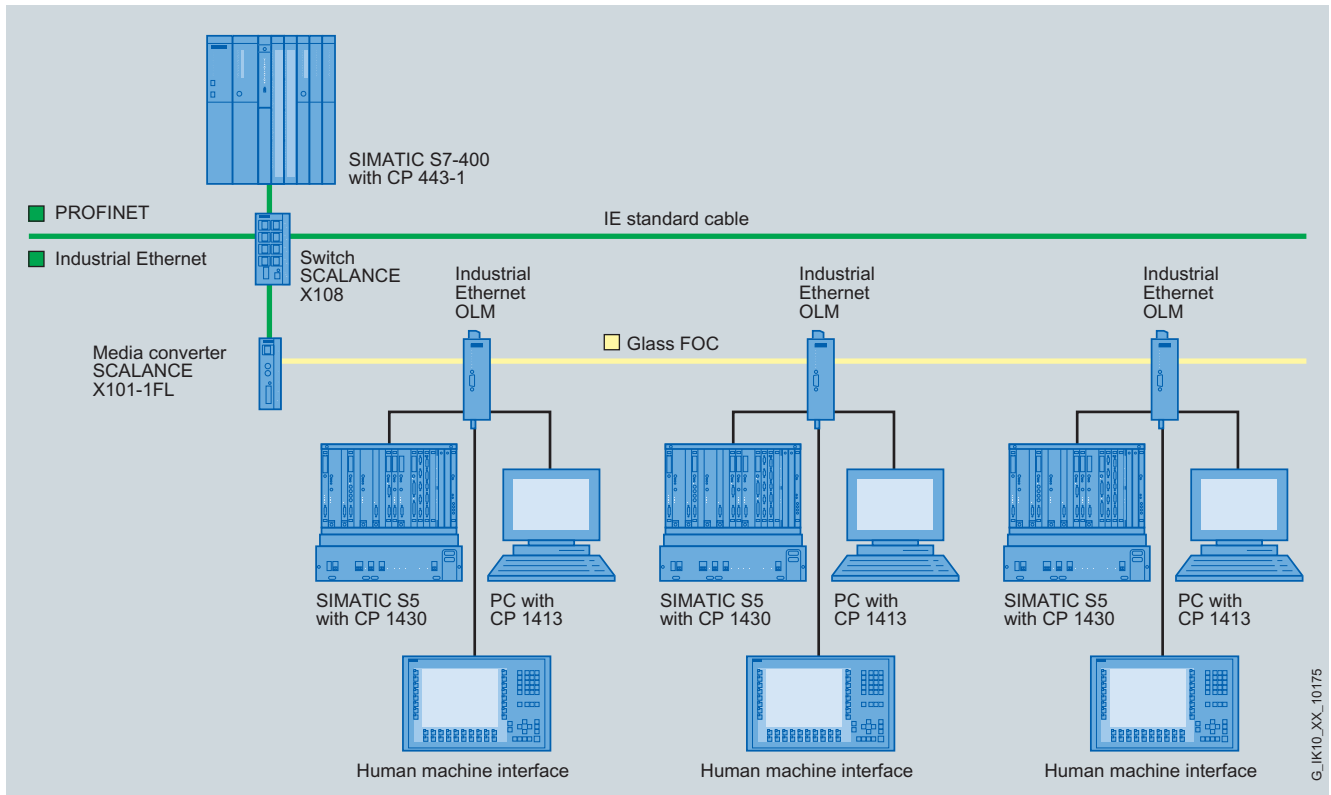
Network structure with plastic fiber optic cabling

PROFINET/Industrial Ethernet

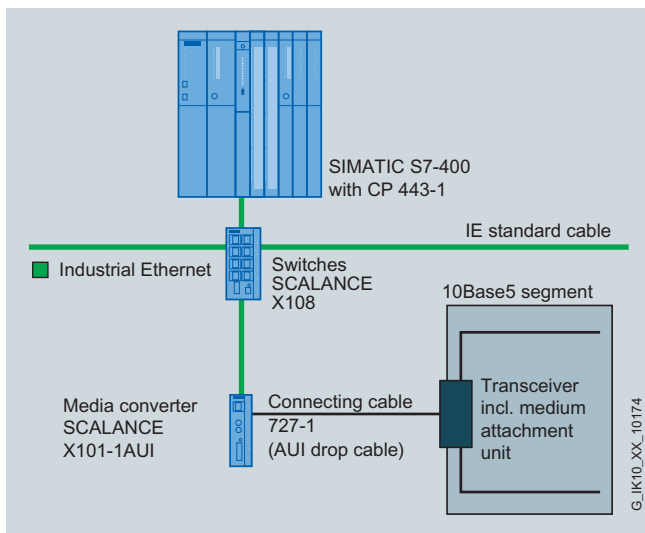
Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Function (continued)



Connection of a 10BaseFL segment to Industrial Ethernet (10/100 Mbit/s) with SCALANCE X101-1FL



Connection of a 10Base5 segment (e.g., SINEC H1) to Industrial Ethernet (10/100 Mbit/s) with SCALANCE X101-1AU

Diagnostics

The following information is displayed on site by LEDs:

- Power
- Port status
- Data traffic

The Industrial Ethernet media converters of the SCALANCE X-100 product line can also be monitored using the floating signaling contact. Two media converters of the same type can be connected in cascading mode.

PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Technical specifications

Order No.	6GK5 101-1BB00-2AA3	6GK5 101-1BC00-2AA3
Product type description	SCALANCE X101-1	SCALANCE X101-1LD
Transfer rate		
• Transfer rate 1	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	100 Mbit/s
• Transfer rate 3	-	-
Number of electrical connections		
• for signaling contact	1	1
• for network components or terminals	1	1
• for redundant voltage supply	1	1
• for voltage supply	1	1
Electrical connection version		
• for signaling contact	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 (10/100 Mbit/s; TP)	RJ45 (10/100 Mbit/s; TP)
• for voltage supply	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	1	1
Version of optical port for fiber-optic cables		
• at 10 Mbit/s	-	-
• at 100 Mbit/s	BFOC sockets (multimode)	BFOC sockets (single-mode)
Version of the C-PLUG swap medium	No	No
Type of supply voltage	DC	DC
Supply voltage	24 V	24 V
• external	24 V	24 V
- Maximum	32 V	32 V
- Minimum	18 V	18 V
Current consumed	120 mA	120 mA
Effective power loss		
• at 24 V DC	3,0 W	3,0 W
Ambient temperature		
• during operation	-10 ... +60 °C	-10 ... +60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%
Width	40 mm	40 mm
Height	125 mm	125 mm
Depth	124 mm	124 mm
Net weight	550 g	550 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30

PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Technical specifications (continued)

Order No.	6GK5 101-1BB00-2AA3	6GK5 101-1BC00-2AA3
Product type description	SCALANCE X101-1	SCALANCE X101-1LD
Standard		
• for EMI of FM	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021
• for safety of CSA	-	-
• For emitted interference	EN 61000-6-3 (Class B)	EN 61000-6-2 (Class A)
• For noise immunity	EN 61000-6-4	EN 61000-6-4
Directive		
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950, CSA C22.2 No. 60950	UL 60950, CSA C22.2 No. 60950
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes
Marine classification association		
• American Bureau of Shipping Europe Ltd. (ABS)	-	-
• Bureau Veritas (BV)	-	-
• Det Norske Veritas (DNV)	-	-
• Germanischer Lloyd (GL)	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes
• Nippon Kaiji Kyokai (NK)	Yes	Yes

Order No.	6GK5 101-1BH00-2AA3	6GK5 101-1BY00-2AA3	6GK5 101-1BX00-2AA3
Product type description	SCALANCE X101-1POF	SCALANCE X101-1FL	SCALANCE X101-1AUI
Transfer rate			
• Transfer rate 1	10 Mbit/s	10 Mbit/s	10 Mbit/s
• Transfer rate 2	100 Mbit/s	-	-
• Transfer rate 3	-	-	-
Number of electrical connections			
• for signaling contact	1	1	1
• for network components or terminals	1	1	2
• for redundant voltage supply	1	1	1
• for voltage supply	1	1	1
Electrical connection version			
• for signaling contact	2-pin terminal block	2-pin terminal block	2-pin terminal block
• for network components or terminals	RJ45 socket (10/100 Mbit/s; TP)	RJ45 socket (10/100 Mbit/s; TP)	RJ45 socket (10/100 Mbit/s; TP); 15-pin Sub-D socket for connection to connecting cable 727-1 (AUI drop cable) or to AUI transceivers (MAU = medium attachment unit)
• for voltage supply	4-pin terminal block	4-pin terminal block	4-pin terminal block
Number of optical ports for fiber-optic cables			
• at 10 Mbit/s	-	1	-
• at 100 Mbit/s	1	-	-
Version of optical port for fiber-optic cables			
• at 10 Mbit/s	-	BFOC sockets (multimode)	-
• at 100 Mbit/s	SC-RJ/POF	-	-
Version of the C-PLUG swap medium	No	No	No

PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Technical specifications (continued)

Order No.	6GK5 101-1BH00-2AA3	6GK5 101-1BY00-2AA3	6GK5 101-1BX00-2AA3
Product type description	SCALANCE X101-1POF	SCALANCE X101-1FL	SCALANCE X101-1AUI
Type of supply voltage	DC	DC	DC
Supply voltage	24 V	24 V	24 V
• external	24 V	24 V	24 V
- Maximum	32 V	32 V	32 V
- Minimum	18 V	18 V	18 V
Current consumed	120 mA	120 mA	160 mA
Effective power loss			
• at 24 V DC	3,0 W	3,0 W	3,0 W
Ambient temperature			
• during operation	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C
• during storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
• during transport	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Maximum relative humidity at 25 °C during operation	95%	95%	95%
Width	40 mm	40 mm	40 mm
Height	125 mm	125 mm	125 mm
Depth	124 mm	124 mm	124 mm
Net weight	550 g	550 g	560 g
Type of fixing	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting	Standard rail, S7-300 rail, wall mounting
Degree of protection	IP30	IP30	IP30
Standard			
• for EMI of FM	FM 3611	FM 3611	FM 3611
• For Ex zone	EN 50021	EN 50021	EN 50021
• for safety of CSA	-	-	-
• For emitted interference	EN 61000-6-3 (Class B)	EN 61000-6-3 (Class B)	EN 61000-6-2 (Class A)
• For noise immunity	EN 61000-6-4	EN 61000-6-4	EN 61000-6-4
Directive			
• for C-Tick	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)	AS/NZS 2064 (Class A)
• for safety of UL	UL 60950, CSA C22.2 No. 60950	UL 60950, CSA C22.2 No. 60950	UL 60950, CSA C22.2 No. 60950
Certificate of suitability	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4
• CE label	Yes	Yes	Yes
Marine classification association			
• American Bureau of Shipping Europe Ltd. (ABS)	-	-	-
• Bureau Veritas (BV)	-	-	-
• Det Norske Veritas (DNV)	-	-	-
• Germanischer Lloyd (GL)	Yes	Yes	Yes
• Lloyds Register of Shipping (LRS)	Yes	Yes	Yes
• Nippon Kaiji Kyokai (NK)	Yes	Yes	Yes

PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

SCALANCE X-100 unmanaged media converter

Ordering data	Order No.	Order No.
SCALANCE X-100 unmanaged media converter Industrial Ethernet media converters, LED diagnostics, fault signaling contact with SET key, redundant power supply, PROFINET-compatible retaining collar; incl. Operating Instructions, Industrial Ethernet network manual and configuration software on CD-ROM		
• SCALANCE X101-1 1 x 10/100 Mbit/s RJ45 Port 1 x 100 Mbit/s multimode BFOC	6GK5 101-1BB00-2AA3	
• SCALANCE X101-1LD 1 x 10/100 Mbit/s RJ45 Port 1 x 100 Mbit/s singlemode BFOC	6GK5 101-1BC00-2AA3	
• SCALANCE X101-1POF 1 x 10/100 Mbit/s RJ45 Port 1 x 100 Mbit/s POF SC RJ	6GK5 101-1BH00-2AA3	
• SCALANCE X101-1AUI 1 x 10/100 Mbit/s RJ45 Port 1 x 10 Mbit/s AUI segment port	6GK5 101-1BX00-2AA3	
• SCALANCE X101-1FL 1 x 10/100 Mbit/s RJ45 Port 1 x 10 Mbit/s multimode BFOC	6GK5 101-1BY00-2AA3	
		Accessories IE FC RJ45 Plugs RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; IE FC RJ45 Plug 180 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface • 1 pack = 1 unit • 1 pack = 10 units • 1 pack = 50 units SIMATIC NET Manual Collection Electronic manuals for communication systems, communication protocols, and communication products; on DVD; German/English
		6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0 6GK1 975-1AA00-3AA0

PROFINET/Industrial Ethernet

Industrial Ethernet Media Converter

SIPLUS SCALANCE X-100 unmanaged media converter

Overview



- The unmanaged Industrial Ethernet media converters of the SCALANCE X-100 product line are optimized for converting various transmission media in Industrial Ethernet networks operating at 10/100 Mbit/s in a line, star and ring topology
- Electrical or optical connection to stations or network in accordance with the port type of the devices
- Rugged metal enclosure for space-saving cabinet mounting on standard rails, S7-300 mounting rails or for wall mounting
- Rugged, industry-standard node connections with PROFINET-compliant RJ45 connectors that latch onto the enclosure to offer additional strain and bending relief
- Redundant power supply
- Diagnostics on the device by means of LEDs (power, link status, data communication)
- Error signaling contact with easy adjustment using the SET button
- Connection of existing 10 Mbit/s fiber-optic networks
- Connection of existing 10Base5 networks (e.g. SINEC H1)

Order No.	6AG1 101-1BB00-4AA3
Order No. based on	6GK5 101-1BB00-2AA3
Product type description	SIPLUS SCALANCE X101-1
Environmental conditions	Suited for exceptional medial load (e.g. by chlorine sulfur atmosphere)
Technical specifications	The technical specifications are identical with those of the based-on modules.

Additional information can be found in the Internet under:
<http://www.siemens.com/siplus-techdocu>

Ordering data

SIPLUS SCALANCE X-100 unmanaged media converter

SIPLUS SCALANCE X101-1
 1 x 10/100 Mbit/s RJ45 Port
 1 x 100 Mbit/s Multimode BFOC

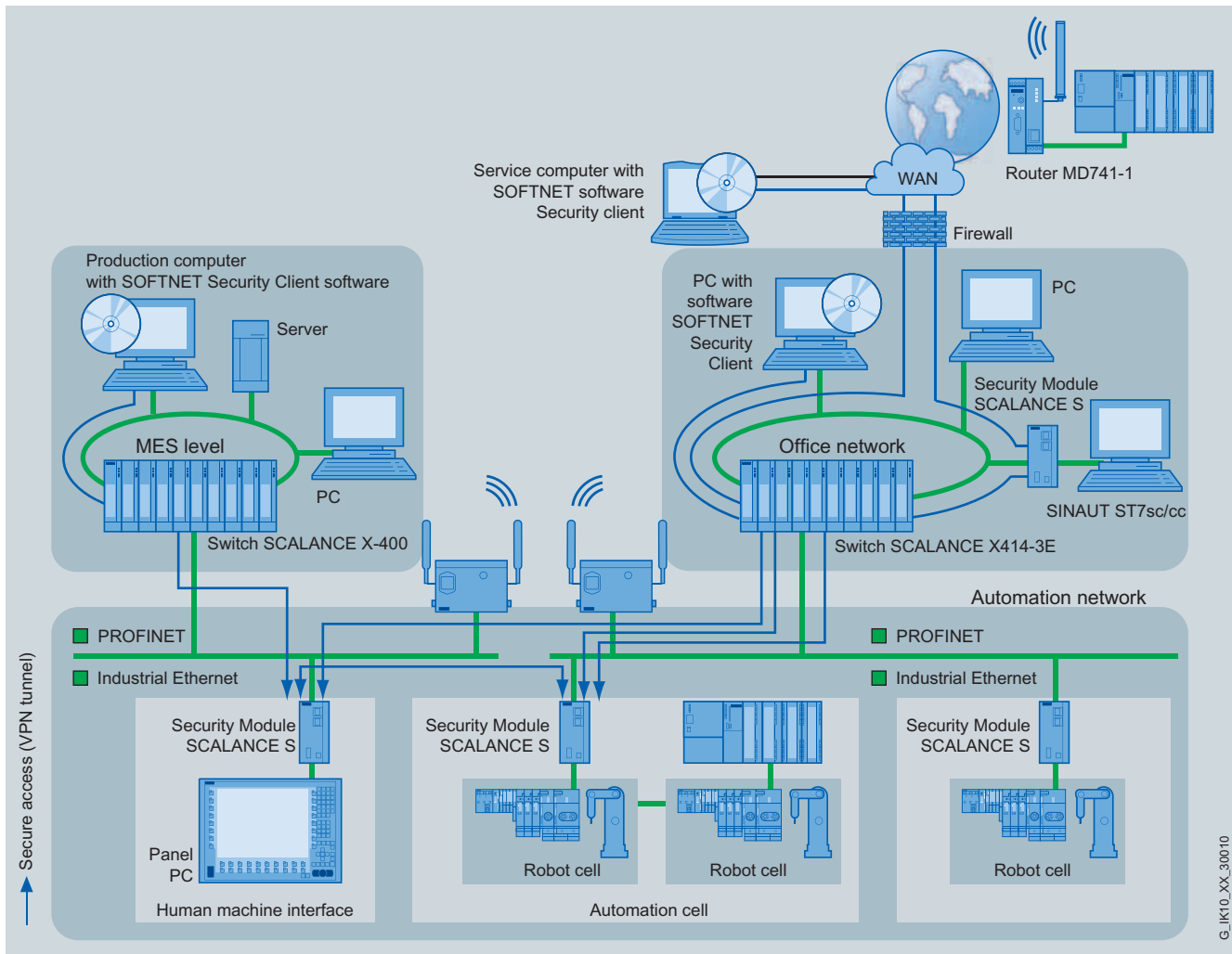
Accessories

Order No.

6AG1 101-1BB00-4AA3

see SCALANCE X-100 unmanaged media converter ordering data

Overview



Secure communication with SCALANCE S

Modern automation technology is based on communication and the trend toward increased networking of individual manufacturing islands. It is becoming more and more important to integrate all the manufacturing components into a uniform network that merges with the office network and the corporate Intranet. There is also a requirement for remote access for servicing, the increasing use of IT mechanisms such as Web servers and e-mail with programmable controllers as well as the use of wireless LANs. In this manner, industrial communication interacts more and more with the IT environment and is now subjected to the same dangers that are well-known from the office and IT environment, such as hackers, viruses, worms and Trojans.

The current security concepts are tailored to the office world and require constant administration and specialist knowledge. They are not usually conversant with the special protocol landscape of industrial communication and are not designed to withstand the harsh environmental conditions.

With its security concept, Siemens offers a safety solution specially designed for industrial automation engineering that satisfies the specific requirements of this application environment.

Advantages of industrial security concept:

- Protection from espionage and data manipulation
- Protection against overloading of the communication system
- Protection against mutual interference
- Protection against addressing mistakes
- Secure remote access also over the Internet
- User-friendly and simple configuration and administration without specialist knowledge of IT security
- No changes or modification of the existing network structure are necessary
- No changes or modification of the existing applications or network stations are necessary
- Rugged, industry-compatible design

SCALANCE S security modules offer a scaleable security functionality:

- Firewall for protecting the programmable controllers from unauthorized access regardless of the size of the network to be protected.
- Supplementary or alternative VPN (Virtual Private Network) for reliable authentication of the communication partners and encryption of the transmitted data
- SOFTNET Security Client for secure access of PCs/notebooks to programmable controllers protected by SCALANCE S (in bridge mode).

PROFINET/Industrial Ethernet

Industrial security

SCALANCE S

Overview



- Security modules for the protection of automation networks and security during data exchange between automation systems.
- Communication is only possible between authenticated and authorized devices
 - protection against operator mistakes
 - prevention of unauthorized access
 - prevention of faults and communications overload
- Rugged, industry-standard station connections with PROFINET-compatible RJ45 connectors that offer additional strain relief and bending strain relief thanks to latching on the housing
- Easier handling thanks to minimal configuration and no special knowledge of IT security is required
- No modification or adaptation of the existing network structure, applications or stations is required
- Safeguarding of communication is independent of the protocol (e.g. PROFINET or other Ethernet-based fieldbus solutions)
- Module replacement without the need for a programming device, using the C-PLUG swap media for backing up the configuration data (not included in the scope of supply)

SCALANCE S602

- Stateful Inspection Firewall
- In addition to bridge mode, can also be operated in router mode and can therefore also be used directly at IP subnet limits
- Address translation
 - NAT (Network Address Translation) permits the use of private IP addresses in the internal network in that public IP addresses are converted to private ones
 - NAPT (Network Address and Port Translation) permits the use of private IP addresses in the internal network in that frames are converted to private IP addresses depending on the communications port used
- Internal network nodes can receive their IP addresses from the integral DHCP server
- Log files can also be evaluated by the Syslog server
- Simple and fast configuration of the firewall through global firewall rules and symbolic names for IP addresses

SCALANCE S612 and SCALANCE S613

- Encryption of data transmission with VPN (IPSec)
 - protection against espionage
 - protection against unauthorized manipulation
- Secure remote access through Internet gateways (e.g. DSL routers) or via GPRS with SINAUT GPRS router MD740-1

Benefits



- Access protection can be implemented for any devices in Ethernet networks
- Secure remote accesses is possible over the Internet (e.g. using DSL routers)
- Problem-free integration into existing networks since it is unnecessary to reconfigure any end stations or introduce new IP subnets
- High flexibility through optional operation as bridge or with router function
- Use of private IP addresses possible in the internal network through NAT (Network Address Translation) or NAPT (Network Address and Port Translation) functionality; public IP addresses can therefore be saved, and automation cells can be designed identically with the same private IP addresses.
- Automatic reading out of log files using Syslog server
- Simple and fast startup; firewall rules which are to apply to several SCALANCE S devices can be combined in global firewall rules.
- Assignment of symbolic names to IP addresses simplifies the configuration and readability of the firewall rules
- Rugged, industry-compatible design tailored to the requirements in an industrial environment
- Device replacement without programming devices, as all information is stored on the replaceable C-PLUG (even file system for IT functions).

Application

The security modules of the SCALANCE S range can be used to protect all devices of an Ethernet network against unauthorized access. In addition, SCALANCE S612 and SCALANCE S613 also protect the data transmission between devices or network segments (e.g. automation cells) against data manipulation and espionage; they can also be used for secure remote access over the Internet, e.g. with DSL routers.

SCALANCE S is optimized for use in automation and industrial environments, and meets the specific requirements of automation systems, such as easy upgrades of existing systems, simple installation and minimal downtimes in the event of a fault.

Note:

You can obtain support regarding the special features of WAN connections and company firewalls/security infrastructures from your local contact.

Technical advice on this subject is available from:

I&S Security Service
Customer Care Desk
Tel.: +49(0)9131-7-28811
E-mail: professionalsupport@siemens.com

Function

Security functions

VPN (Virtual Private Network)

(only for SCALANCE S612 and SCALANCE S613); for reliable authentication (identification) of the network stations, for encrypting the data and checking data integrity.

- Authentication;
All incoming data traffic is monitored and checked. As IP addresses can be falsified (IP spoofing), checking the IP address (of the client access) is not sufficient. In addition, Client PCs may have changing IP addresses. For this reason the authentication is performed by means of tried and tested VPN mechanisms.
- Data encryption;
Secure encryption is necessary in order to protect data communication from espionage and unauthorized manipulation. This means that the data traffic remains incomprehensible to any eavesdropper in the network. The SCALANCE Security Module establishes VPN tunnels to other Security Modules for this purpose.

Firewall;

Can be used as an alternative or to supplement VPN with flexible access control.

The firewall filters data packets and disables or enables communications links in accordance with the filter list (packet filter firewall). Both incoming and outgoing communication can be filtered, IP and MAC addresses, as well as communication protocols (ports).

- Logging;
access data are saved by the Security Module in a log file. Detection of how, when and by whom it has been accessed is as important as detecting access attempts, to ensure that appropriate preventative measures can be taken.

Versions:

- **SCALANCE S602;**
uses Stateful Inspection Firewall to protect network segments against unauthorized access
- **SCALANCE S612;**
uses Stateful Inspection Firewall to protect network segments against unauthorized access;
protects up to 32 devices using VPN tunnels (up to 64 VPN tunnels simultaneously)
- **SCALANCE S613;**
uses Stateful Inspection Firewall to protect network segments against unauthorized access
- Protects up to 64 devices using VPN tunnels,
(up to 128 VPN tunnels simultaneously)
- extended temperature range from -20 °C to +70 °C

Configuration

Configuring is simple to carry out even without special IT knowledge. Only the Security Modules or SOFTNET Security Clients that have to communicate with each other securely have to be created and configured. All the configuration data can be saved on the optional C-PLUG swap media (not included in scope of supply) so that the Security Module can be replaced quickly in the event of a fault and without the need of a programming device.

PROFINET/Industrial Ethernet

Industrial security

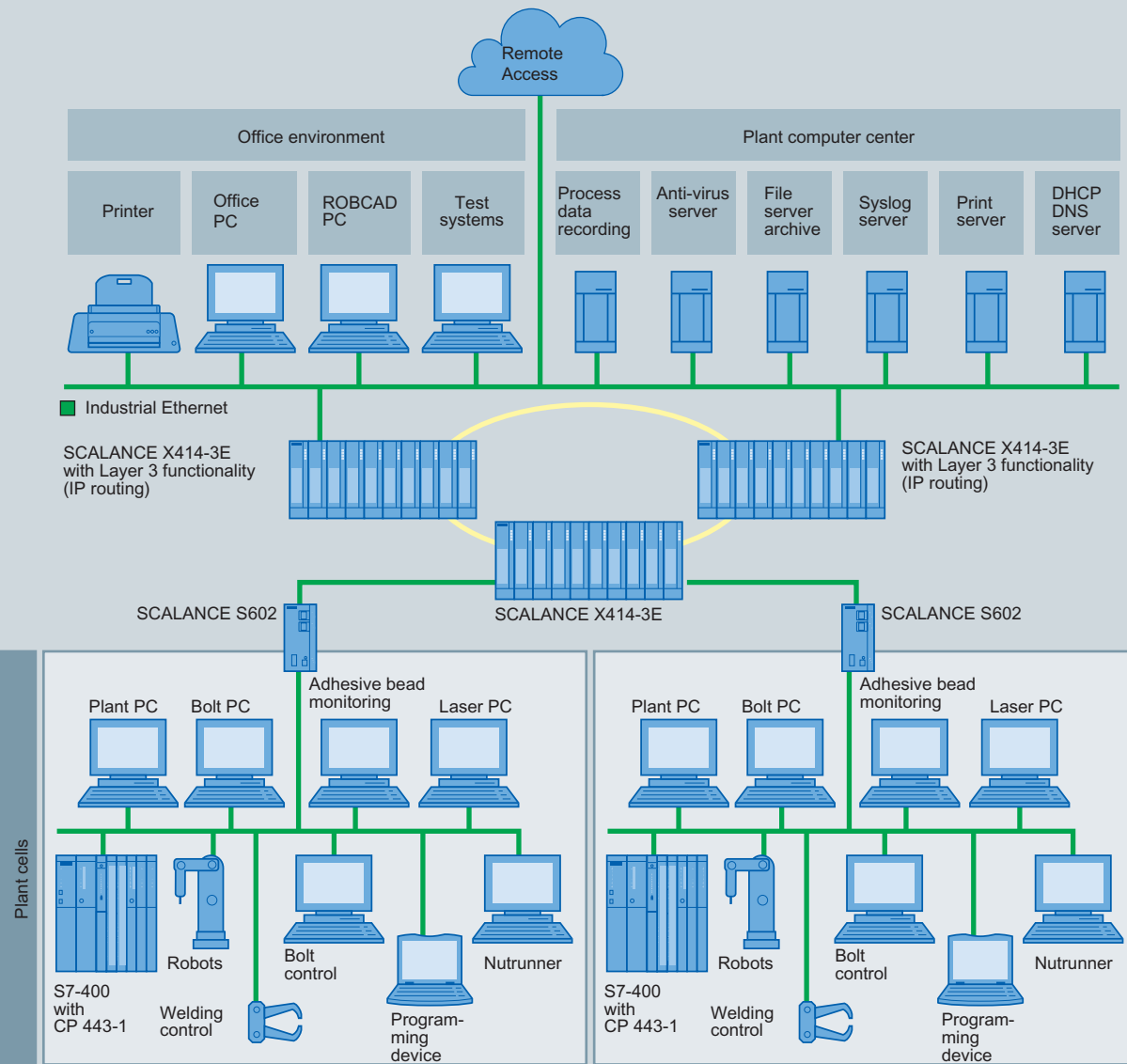
SCALANCE S

Function (continued)

Configuration

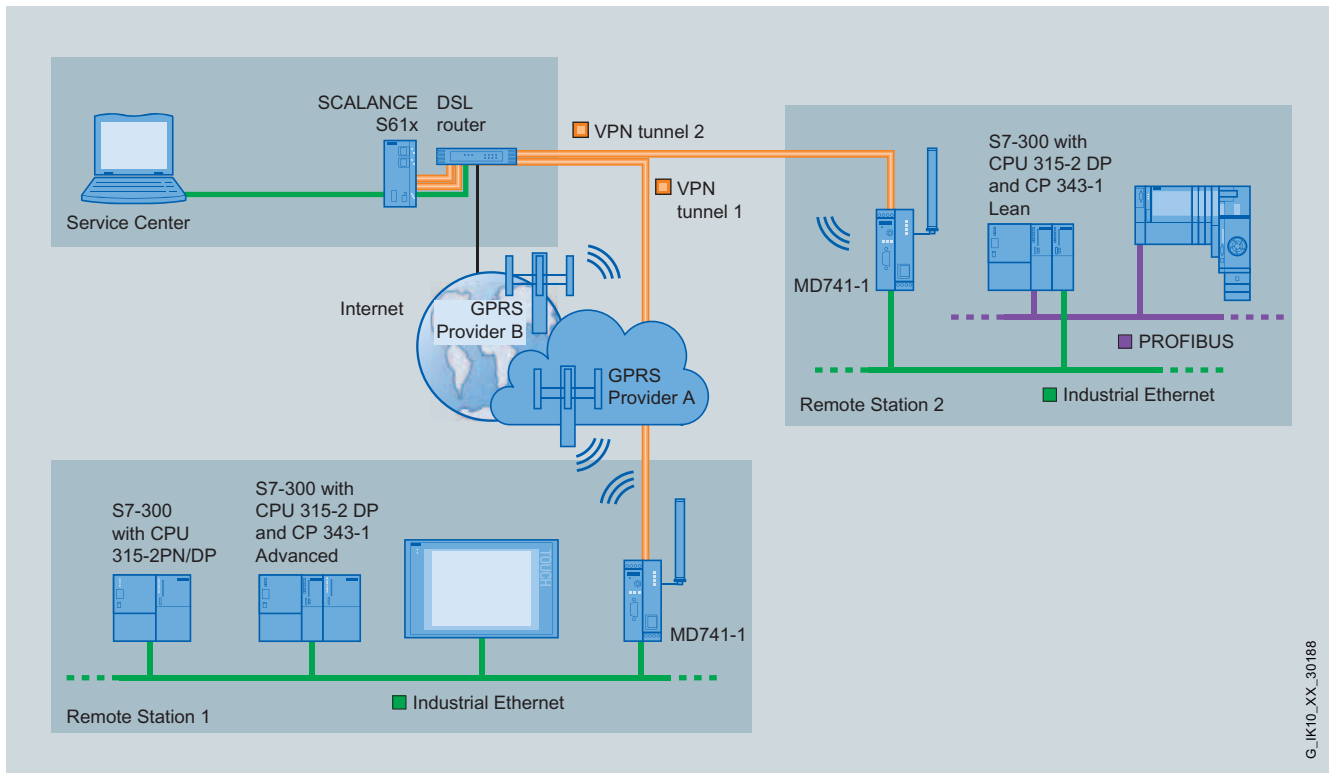
Works network

Bodyshop production network



Plant network protected by SCALANCE S

G_IK_XX_30043

Function (continued)

Secure remote access over Internet with SCALANCE S, DSL router and EGPRS router MD741-1

PROFINET/Industrial Ethernet

Industrial security

SCALANCE S

Technical specifications

Order No.	6GK5 602-0BA00-2AA3	6GK5 612-0BA00-2AA3	6GK5 613-0BA00-2AA3
Product type description	SCALANCE S602	SCALANCE S612	SCALANCE S613
Electrical connection version			
• for external network	1 x RJ45 (10/100 Mbit/s; TP)	1 x RJ45 (10/100 Mbit/s; TP)	1 x RJ45 (10/100 Mbit/s; TP)
• for internal network	1 x RJ45 (10/100 Mbit/s; TP)	1 x RJ45 (10/100 Mbit/s; TP)	1 x RJ45 (10/100 Mbit/s; TP)
• for signaling contact	1 x 2-pin terminal block	1 x 2-pin terminal block	1 x 2-pin terminal block
• for voltage supply	1 x 4-pin terminal block	1 x 4-pin terminal block	1 x 4-pin terminal block
• for TP cable(s)	-	-	-
Number of possible connections in the case of VPN connection	-	64	128
Number of network nodes	-	32	64
Transfer rate			
• 1	10 Mbit/s	10 Mbit/s	10 Mbit/s
• 2	100 Mbit/s	100 Mbit/s	100 Mbit/s
Supply voltage for DC			
• Rated value	24 V	24 V	24 V
• Maximum	28.8 V	28.8 V	28.8 V
• Minimum	20.4 V	20.4 V	20.4 V
current consumed at 24 V	130 mA	130 mA	130 mA
Effective power loss	3 W	3 W	3 W
Ambient temperature			
• during operation	0 ... +60 °C	0 ... +60 °C	-20 ... +70 °C
• during storage	-40 ... +85 °C	-40 ... +85 °C	-40 ... +85 °C
• during transport	-40 ... +85 °C	-40 ... +85 °C	-40 ... +85 °C
Maximum relative humidity at 30 °C during operation	95%	95%	95%
Width	60 mm	60 mm	60 mm
Height	125 mm	125 mm	125 mm
Depth	124 mm	124 mm	124 mm
Type of fixing	Snap-fit onto standard mounting rail, screw-mounting onto S7-300 subrack and onto horizontal and vertical surfaces	Snap-fit onto standard mounting rail, screw-mounting onto S7-300 subrack and onto horizontal and vertical surfaces	Snap-fit onto standard mounting rail, screw-mounting onto S7-300 subrack and onto horizontal and vertical surfaces
Net weight	700 g	700 g	700 g
Degree of protection	IP30	IP30	IP30
Certificate of suitability	FM 3611, UL 60950, CSA C22.2 No. 60950, AS/NZS 2064 (Class A), EN 50021, EN 61000-6-2, EN 61000-6-4	FM 3611, UL 60950, CSA C22.2 No. 60950, AS/NZS 2064 (Class A), EN 50021, EN 61000-6-2, EN 61000-6-4	FM 3611, UL 60950, CSA C22.2 No. 60950, AS/NZS 2064 (Class A), EN 50021, EN 61000-6-2, EN 61000-6-4
• ATEX	Yes	Yes	Yes
• C-TIC	Yes	Yes	Yes
• CE label	Yes	Yes	Yes
• CSA C22.2 No. 60950 Approval	Yes	Yes	Yes
• FM approval	Yes	Yes	Yes
Marine classification association	American Bureau of Shipping, Nippon Kaiji Kyokai	American Bureau of Shipping, Nippon Kaiji Kyokai	American Bureau of Shipping, Nippon Kaiji Kyokai

2/189

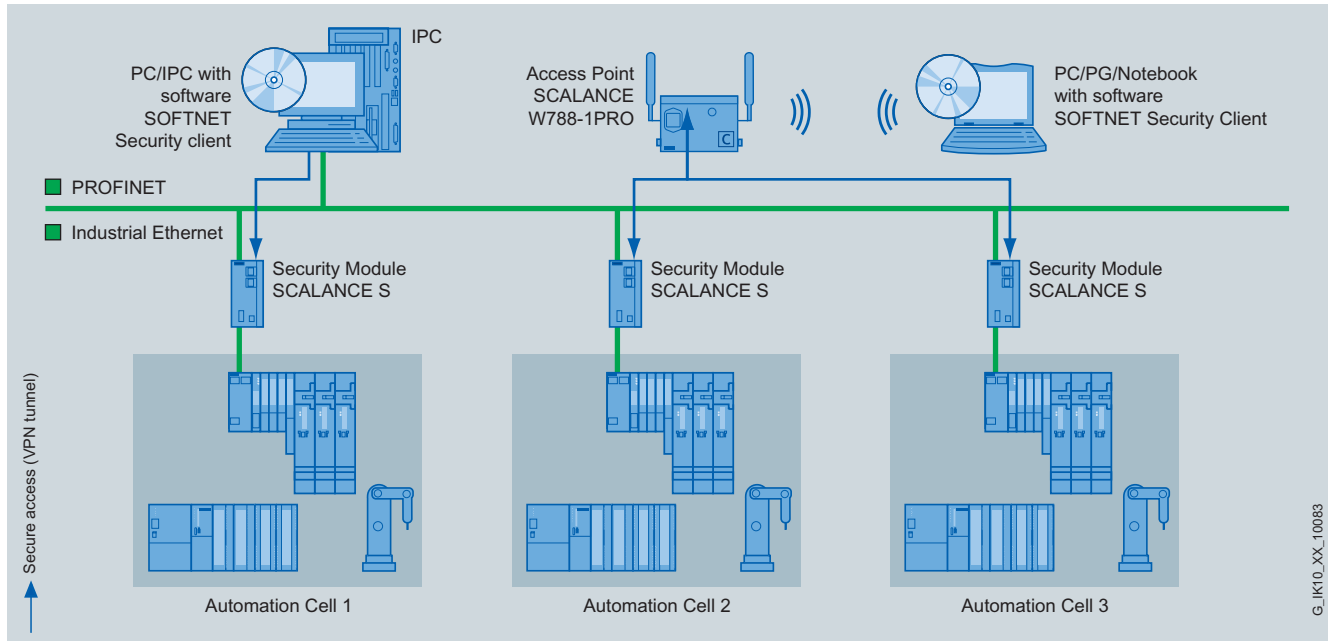
PROFINET/Industrial Ethernet

Industrial security

SOFTNET Security Client

Overview

- The SOFTNET Security Client is a component of the industrial security concept for protecting automation devices and for security during data exchange between automation systems.
- VPN Client for programming devices, PCs and Notebooks in industrial environments; secure VPN client access is supported as the automation systems are protected by SCALANCE S.
- Data transmission is protected against maloperation, eavesdropping/espionage and manipulation; communication can only take place between authenticated and authorized devices.
- Uses the IPSec mechanisms already tried and tested in the office sector for setting up and operating VPNs.



Secure access to automation cells protected by SCALANCE S612/S613 with SOFTNET Security Client

Benefits

- Secure access by programming devices or notebooks to automation devices or complete automation cells
- Simple use on mobile PCs when using the SOFTNET Security Client, as no external device is required for securing the communication
- Consistent security concept for the automation system with SCALANCE S and SOFTNET Security Client
- Protecting data transmission against espionage and manipulation by means of certified standards.
- Simple operation, can be implemented without special IT knowledge
- Non-secure devices can be integrated into the secure data traffic
- Reaction-free; no change to existing network infrastructures is required
- Communication can be protected independent of the IP-based application protocol used

Application

Security modules of the SCALANCE S family are provided specially for use in automation, yet connect seamlessly with the security structures of the office and IT world. They offer security and meet the specific requirements of automation systems, such as easy upgrades of existing systems, simple installation and minimal downtimes in the event of a fault.

Depending on the respective security needs, various different security measures can be combined with one another. The SOFTNET Security Client allows programming devices, PCs and notebook computers access to network nodes or automation systems protected by SCALANCE S.

Note:

You can obtain support regarding the special features of WAN connections and company firewalls/security infrastructures from your local contact.

Technical advice on this subject is available from:

I&S Security Service

Customer Care Desk

Tel.: +49(0)9131-7-28811

E-mail: professionalsupport@siemens.com

G_IK10_XX_10083

Function

Authentication

Each incoming item of data traffic is monitored and checked. As IP addresses can be falsified (IP spoofing), checking the IP address (of the client access) is not sufficient. In addition, Client PCs may have changing IP addresses. For this reason the authentication is performed by means of tried and tested VPN mechanisms.

Data encryption

To protect the data traffic against espionage and manipulation secure encryption is necessary. This means that the data traffic remains incomprehensible to any eavesdropper in the network. To this end, SOFTNET Security Client sets up VPN tunnels based on IPSec to other SCALANCE S security modules.

Performance data

- System requirements:
Windows 2000 Professional (32 bit) + SP3, 4
Windows XP Professional (32 bit) + SP1, 2

Configuring

Using the associated configuration tool it is possible to handle setup and administration of security rules even without special IT knowledge. In the simplest case, only the SCALANCE S modules or SOFTNET security clients that are to communicate with one another are set up and configured. As soon as SOFTNET Security Client knows which automation device is to be accessed, a communication can be set up.

Ordering data

Order No.

SOFTNET Security Client Edition 2006

Software for designing secure IP-based VPN connections from programming device/PC to network segments which are secured by SCALANCE S in bridge mode; single license for 1 installation, runtime software (German/English), configuring tool (German/English) and electronic manual on CD-ROM (German/English/French/Italian/Spanish) for 32-bit Windows, XP Professional + SP1, 2 Windows 2000 Professional + SP3, 4

6GK1 704-1VW01-0AA0

SCALANCE S Industrial Security Modules

For protection of programmable controllers and automation networks, and for safeguarding of industrial communication; configuring tool and electronic manual on CD-ROM German, English, French, Italian, Spanish

SCALANCE S612

Uses Stateful Inspection Firewall to protect network segments against unauthorized access; protects up to 32 devices, up to 64 VPN tunnels simultaneously

6GK5 612-0BA00-2AA3

SCALANCE S613

Uses Stateful Inspection Firewall to protect network segments against unauthorized access; protects up to 64 devices, up to 128 VPN tunnels simultaneously expanded temperature range from -20 °C to +70 °C

6GK5 613-0BA00-2AA3

IE FC RJ45 Plug 180

RJ45 plug-in connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

EGPRS router MD741-1

For wireless IP communication from Ethernet-based programmable controllers via GSM mobile radio networks; integrated firewall and VPN router (IPsec); quad band GSM; EGPRS Multislot Class 12

6NH9 741-1AA00

Accessories

ANT794-4MR antenna

Quad band antenna for MD720-3 and MD741-1, omnidirectional with 5 m cable

6NH9 860-1AA00

PROFINET/Industrial Ethernet

CPU 315-2 PN/DP

CPU 315-2 PN/DP

Overview



- The CPU with mid-range program memory and quantity frameworks
- High processing power in binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- Integral PROFINET interface
- Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)
- PROFINET IO Controller for operating distributed I/O on PROFINET
- Combined MPI/PROFIBUS DP master/slave interface
- Isochronous mode on PROFIBUS

Micro Memory Card required for operation of CPU.

Technical specifications

Order No.	6ES7 315-2EH13-0AB0
Product type description	CPU 315-2 PN/DP
Product status	
associated programming package	STEP 7 V5.4 SP2
Supply voltages	
Rated value	
• 24 V DC	Yes
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V
Current consumption	
Inrush current, typ.	2.5 A
I_{Σ}^{t}	1 A ² s
Current consumption (in no-load operation), typ.	100 mA
Current consumption (rated value)	650 mA
Power loss, typ.	3.5 W
Memory	
Type of storage	
• RAM	
- integrated	256 KByte; For program and data
- erweiterbar	No
• Load memory	
- pluggable (MMC)	Yes
- pluggable (MMC), max.	8 MByte
Backup	
• present	Yes
• without battery	Yes; Program and data
CPU/blocks	
DB	
• Number, max.	1 023; Number band: 1 to 1023
• Size, max.	16 KByte
FB	
• Number, max.	1 024; Sequence of numbers: 0 to 2047
• Size, max.	16 KByte

Order No.	6ES7 315-2EH13-0AB0
Product type description	CPU 315-2 PN/DP
FC	
• Number, max.	1 024; Sequence of numbers: 0 to 2047
• Size, max.	16 KByte
OB	
• Size, max.	16 KByte
Nesting depth	
• per priority class	8
• additional within an error OB	4
CPU/processing times	
for bit operations, min.	0.1 μs
for word operations, min.	0.2 μs
for fixed point arithmetic, min.	2 μs
for floating point arithmetic, min.	3 μs
Times/counters and their remanence	
S7 counter	
• Number	256
• of which remanent without battery	
- adjustable	Yes
- lower limit	0
- upper limit	255
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	255
• Counting range	
- adjustable	Yes
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 315-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 315-2EH13-0AB0
Product type description	CPU 315-2 PN/DP
S7 times	
• Number	256
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	255
• Time range	
- lower limit	10 ms
- upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
Flag	
• Number, max.	2 048 Byte
• Remanence available	Yes; MB 0 to MB 2047
• Number of clock memories	8; 1 memory byte
Data blocks	
• Number, max.	1 023; From DB 1 to DB 1023
• Size, max.	16 KByte
• Remanence adjustable	Yes; via non-retain property on DB
• Remanence preset	yes
Local data	
• per priority class, max.	1 024 Byte; per block max. 510
Address area	
I/O address area	
• Inputs	2 KByte
• Outputs	2 KByte
• of which, distributed	
- Inputs	2 KByte
- Outputs	2 KByte
Process image	
• Inputs	2 048 Byte
• Outputs	2 048 Byte
Digital channels	
• Inputs, of which central	1 024; max.
• Outputs, of which central	1 024; max.
Analog channels	
• Inputs, of which central	256; max.
• Outputs, of which central	256; max.

Order No.	6ES7 315-2EH13-0AB0
Product type description	CPU 315-2 PN/DP
Hardware config.	
Modules per rack, max.	8
Number of DP masters	
• integrated	1
• via CP	4
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Deviation per day, max.	10 s
Operating hours counter	
• Number	1
• Number/Number range	0
• Range of values	2 ³¹ hours (when using the SFC 101)
• Granularity	1 hour
• remanent	Yes
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes
• on Ethernet via NTP	as client
S7 message functions	
Number of login stations for message functions, max.	16
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	40
Test commissioning functions	
Status/control	
• Variables	Inputs, outputs, memory bits, DB, times, counters
Forcing	
• Force, variables	Inputs, outputs
Diagnostic buffer	
• Number of entries, max.	500

2

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 315-2 PN/DP

2

Technical specifications (continued)

Order No.	6ES7 315-2EH13-0AB0
Product type description	CPU 315-2 PN/DP
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	22 Byte
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
S5-compatible communication	
• supported	Yes; via CP and loadable FC
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	1 460 Byte; with connection type 01H; 8192 bytes with connection type 11H
Number of connections	
• overall	16
• usable for PG communication	15; max.
• usable for OP communication	15
• usable for S7 basic communication	14
• usable for routing	X1 configured as 1) MPI: max. 10; 2) DP master: max. 24; 3) DP slave (active): max. 14; X2 configured as PROFINET: max. 24
PROFINET CBA (at set setpoint communication load)	
• Setpoint for the CPU communication load	50%
• Number of remote interconnection partners	32
• Number of functions, master/slave	30
• Total of all master/slave connections	1 000
• Data length of all incoming connections master/slave, max.	4 000 Byte
• Data length of all outgoing connections master/slave, max.	4 000 Byte
• Number of device-internal and PROFIBUS interconnections	500
• Data length of device-internal and PROFIBUS interconnections, max.	4 000 Byte
• Data length per connection, max.	1 400 Byte

Order No.	6ES7 315-2EH13-0AB0
Product type description	CPU 315-2 PN/DP
• Remote interconnections with acyclic transmission	
- Sampling frequency: sampling interval, min.	500 ms
- Number of incoming interconnections	100
- Number of outgoing interconnections	100
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	1 400 Byte
• Remote interconnections with cyclic transmission	
- Transmission frequency: transmission interval, min.	10 ms
- Number of incoming interconnections	200
- Number of outgoing interconnections	200
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	450 Byte
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	3; 2x PN OPC/1x iMap
- HMI variable updating	500 ms
- Number of HMI variables	200
- Data length of all HMI variables, max.	2 000 Byte
• PROFIBUS proxy functionality	
- supported	Yes
- Number of linked PROFIBUS devices	16
- Data length per connection, max.	240 Byte; Slave-dependent
1st interface	
Physics	RS 485
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
• Transmission speeds, max.	12 MBit/s
• Address area	
- Inputs, max.	2 KByte
- Outputs, max.	2 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 315-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 315-2EH13-0AB0
Product type description	CPU 315-2 PN/DP
DP slave	
• Services	
- Routing	only with active interface
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Address area, max.	with max. 32 bytes each
2nd interface	
Type of interface	PROFINET
Physics	Ethernet RJ 45
isolated	Yes
automatic detection of transmission speed	Yes; (10/100 Mbit/s)
PROFINET IO controller	
• Services	
- PG/OP communication	Yes
- Routing	Yes
- S7 communication	with loadable FBs, max. configurable connections: 14, max. number of instances: 32 via TCP/IP, ISO on TCP and UDP
- open IE communication	
• Transmission speed, max.	100 MBit/s
• Number of connectable IO-devices, max.	128
• Updating time	1 to 512 ms (minimum value depends on communication share set for PROFINET I/O, on the number of I/O devices and on the number of configured net data items)
• Address area	
- Inputs, max.	2 KByte
- Outputs, max.	2 KByte
- Useful data consistency, max.	254 Byte

Order No.	6ES7 315-2EH13-0AB0
Product type description	CPU 315-2 PN/DP
CPU/programming	
Programming language	
• STEP 7	V5.4 SP2 or higher
Nesting levels	8
User program protection/ password protection	Yes
Dimensions	
Width	80 mm
Height	125 mm
Depth	130 mm
Weights	
Weight, approx.	460 g

2

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-300

CPU 315-2 PN/DP

2

Ordering data	Order No.	Order No.
CPU 315-2 PN/DP Main memory 256 KB, power supply 24 V DC, combined MPI/PROFIBUS DP master/slave interface, Ethernet/PROFINET interface; MMC required	6ES7 315-2EH13-0AB0	
Micro Memory Card <ul style="list-style-type: none"> • 64 KB • 128 KB • 512 KB • 2 MB • 4 MB • 8 MB 	6ES7 953-8LF20-0AA0 6ES7 953-8LG11-0AA0 6ES7 953-8LJ20-0AA0 6ES7 953-8LL20-0AA0 6ES7 953-8LM20-0AA0 6ES7 953-8LP20-0AA0	
MPI cable For connecting SIMATIC S7 and the PG through MPI; 5 m in length	6ES7 901-0BF00-0AA0	
Slot number plates	6ES7 912-0AA00-0AA0	
S7-300 manual Design, CPU data, module data, instruction list <ul style="list-style-type: none"> • German • English • French • Spanish • Italian 	6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0	
SIMATIC Manual Collection Electronic manuals on DVD, multi-lingual: S7-200, S7-300, C7, S7-400, SIMATIC DP (distributed I/O), SIMATIC PC, SIMATIC PG (programming devices), STEP 7, Engineering Tools, Runtime Software, SIMATIC PCS 7, SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication), SIMATIC Machine Vision, SIMATIC Sensors	6ES7 998-8XC01-8YE0	
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	6ES7 998-8XC01-8YE2	
Power supply connector 10 units, spare part	6ES7 391-1AA00-0AA0	
Manual "Communication for SIMATIC S7-300/-400" <ul style="list-style-type: none"> • German • English • French • Spanish • Italian 	6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0	
SIMATIC S7 training case With mounting components for mounting S7-200 and S7-300	6ES7 910-3AA00-0XA0	
PROFINET bus components		
PROFIBUS DP bus connector RS 485 <ul style="list-style-type: none"> • With 90° cable outlet, max. transmission rate 12 Mbit/s <ul style="list-style-type: none"> - Without PG interface - With PG interface • With 90° cable outlet for FastConnect connection system, max. transmission rate 12 Mbit/s <ul style="list-style-type: none"> - Without PG interface - With PG interface • With axial cable outlet for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS 		6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0 6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0 6GK1 500-0EA02
PROFIBUS Fast Connect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m		6XV1 830-0EH10
RS 485 repeater for PROFIBUS Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing		6ES7 972-0AA01-0XA0

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 315-2 PN/DP

Ordering data (continued)	Order No.	Order No.
PROFINET bus components		IE FC RJ45 plugs
IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10	RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables IE FC RJ45 plug 180 180° cable outlet <ul style="list-style-type: none"> • 1 unit • 10 units • 50 units
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A	
Industrial Ethernet Switch SCALANCE X208 with eight 10/100 Mbit/s RJ45 ports	6GK5 208-0BA10-2AA3	
Compact Switch Module CSM 377 Unmanaged switch for the connection of a SIMATIC S7-300, ET 200M and as many as three other nodes to an Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module incl. electronic equipment manual on CD-ROM	6GK7 377-1AA00-0AA0	
		6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0

2

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

SIPLUS CPU 315-2 PN/DP (extended temperature range)

Overview



- The CPU with medium-sized program memory and quantity structures
- High processing performance in binary and floating-point arithmetic
- Used as central controller in production lines with central and distributed I/O
- Integrated PROFINET interface
- Combined MPI/PROFIBUS DP master/slave interface
- Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)
- PROFINET IO Controller to operate distributed I/Os on PROFINET

Micro Memory Card required for operation of CPU.

Order No.	6AG1 315-2EH13-2AB0	6AG1 315-2EH13-2AY0
Order No. based on	6ES7 315-2EH13-0AB0	6ES7 315-2EH13-0AB0
Product type description	SIPLUS CPU 315-2 PN/DP	
Ambient temperature range	-25 ... +60 °C; condensation permitted	
Environmental conditions	Suited for exceptional medial load (e.g. by chlorine sulfur atmosphere).	
Conforms with standard for electronic equipment used on rolling stock (EN 50155)	No	Yes
Technical specifications	The technical specifications are identical with those of the based-on modules.	

Additional information can be found in the Internet under:
<http://www.siemens.com/siplus-techdocu>

Ordering data

Order No.

SIPLUS CPU 315-2 PN/DP

256 Kbyte main memory,
24 V DC power supply,
combined MPI/PROFIBUS DP-
Master/Slave interface
Ethernet/PROFINET interface
MMC required

- Conforms with the norm
for electronic equipment used
on rolling stock (EN 50155)

6AG1 315-2EH13-2AB0

6AG1 315-2EH13-2AY0

Accessories

see CPU 315-2 PN/DP
ordering data

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 317-2 PN/DP

Overview



- The CPU with a large program memory and quantity framework for demanding applications
- For cross-sector automation tasks in series machine, special machine and plant construction
- Used as central controller in production lines with central and distributed I/O
- High processing power in binary and floating-point arithmetic
- Distributed intelligence in Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)
- PROFINET I/O Controller for operating distributed I/O on PROFINET
- Combined MPI/PROFIBUS DP master/slave interface
- For comprehensive I/O expansion
- For configuring distributed I/O structures
- Isochronous mode on PROFIBUS
- Optionally supports the use of SIMATIC engineering tools

Micro Memory Card required for operation of CPU.

Technical specifications

Order No.	6ES7 317-2EK13-0AB0
Product type description	CPU 315-2 PN/DP
Product status	
associated programming package	STEP 7 V5.4 + SP2 or higher
Supply voltages	
Rated value	
• 24 V DC	Yes
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V
Current consumption	
Inrush current, typ.	2.5 A
I ² t	1 A ² s
Current consumption (in no-load operation), typ.	100 mA
Current consumption (rated value)	650 mA
Power loss, typ.	3.5 W
Memory	
Type of storage	
• RAM	
- integrated	1 MByte; For program and data
• Load memory	
- pluggable (MMC)	Yes
- pluggable (MMC), max.	8 MByte
Backup	
• present	Yes
• without battery	Yes; Program and data

Order No.	6ES7 317-2EK13-0AB0
Product type description	CPU 315-2 PN/DP
CPU/blocks	
DB	
• Number, max.	2 047; Number band: 1 to 2047
• Size, max.	64 KByte
FB	
• Number, max.	2 048;
• Size, max.	Sequence of numbers: 0 to 2047 64 KByte
FC	
• Number, max.	2 048;
• Size, max.	Sequence of numbers: 0 to 2047 64 KByte
OB	
• Size, max.	64 KByte
Nesting depth	
• per priority class	16
• additional within an error OB	4
CPU/processing times	
for bit operations, min.	0.05 µs
for word operations, min.	0.2 µs
for fixed point arithmetic, min.	0.2 µs
for floating point arithmetic, min.	1 µs

PROFINET/Industrial Ethernet

CPU 317-2 PN/DP

CPU 317-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 317-2EK13-0AB0
Product type description	CPU 315-2 PN/DP
Times/counters and their remanence	
S7 counter	
• Number	512
• of which remanent without battery	
- adjustable	Yes
- lower limit	0
- upper limit	511
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	511
• Counting range	
- adjustable	Yes
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB
S7 times	
• Number	512
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	511
• Time range	
- lower limit	10 ms
- upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
Flag	
• Number, max.	4 096 Byte
• Remanence available	Yes; MB 0 to MB 4095
• Number of clock memories	8; 1 memory byte
Data blocks	
• Number, max.	2 047; from DB 1 to DB 2047
• Size, max.	64 KByte
• Remanence adjustable	Yes; via non-retain property on DB
• Remanence preset	yes
Local data	
• per priority class, max.	1 024 Byte
Address area	
I/O address area	
• Inputs	8 KByte
• Outputs	8 KByte
• of which, distributed	
- Inputs	8 KByte
- Outputs	8 KByte

Order No.	6ES7 317-2EK13-0AB0
Product type description	CPU 315-2 PN/DP
Process image	
• Inputs	2 048 Byte
• Outputs	2 048 Byte
• Inputs, adjustable	2 048 Byte
• Outputs, adjustable	2 048 Byte
• Inputs, preset	256 Byte
• Outputs, preset	256 Byte
Digital channels	
• Inputs, of which central	1 024
• Outputs, of which central	1 024
Analog channels	
• Inputs, of which central	256
• Outputs, of which central	256
Hardware config.	
Modules per rack, max.	8
Number of DP masters	
• integrated	1
• via CP	4
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Deviation per day, max.	10 s
Operating hours counter	
• Number	4
• Number/Number range	0 to 3
• Range of values	0 to 2 ³¹ hours (when using SFC 101)
• Granularity	1 hour
• remanent	Yes
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes
• on Ethernet via NTP	as client
S7 message functions	
Number of login stations for message functions, max.	32
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	60
Test commissioning functions	
Status/control	
• Variables	Inputs, outputs, memory bits, DB, times, counters
Forcing	
• Force, variables	Inputs, outputs
Diagnostic buffer	
• Number of entries, max.	500

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 317-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 317-2EK13-0AB0
Product type description	CPU 315-2 PN/DP
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	22 Byte
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
S5-compatible communication	
• supported	Yes; via CP and loadable FC
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	1 460 Byte; with connection type 01H; 8192 bytes with connection type 11H
• ISO-on-TCP (RFC1006)	via integrated PROFINET interface and loadable FBs
• UDP	via integrated PROFINET interface and loadable FBs
Number of connections	
• overall	32
• usable for PG communication	31
• usable for OP communication	31
• usable for S7 basic communication	30
• usable for routing	X1 configured as 1) MPI: max. 10; 2) DP master: max. 24; 3) DP slave (active): max. 14; X2 configured as PROFINET: max. 24
PROFINET CBA (at set setpoint communication load)	
• Setpoint for the CPU communication load	50%
• Number of remote interconnection partners	32
• Number of functions, master/slave	30
• Total of all master/slave connections	1 000
• Data length of all incoming connections master/slave, max.	4 000 Byte
• Data length of all outgoing connections master/slave, max.	4 000 Byte
• Number of device-internal and PROFIBUS interconnections	500
• Data length of device-internal and PROFIBUS interconnections, max.	4 000 Byte
• Data length per connection, max.	1 400 Byte

Order No.	6ES7 317-2EK13-0AB0
Product type description	CPU 315-2 PN/DP
• Remote interconnections with acyclic transmission	
- Sampling frequency: sampling interval, min.	500 ms
- Number of incoming interconnections	100
- Number of outgoing interconnections	100
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	1 400 Byte
• Remote interconnections with cyclic transmission	
- Transmission frequency: transmission interval, min.	10 ms
- Number of incoming interconnections	200
- Number of outgoing interconnections	200
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	450 Byte
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	3; 2x PN OPC/1x iMap
- HMI variable updating	500 ms
- Number of HMI variables	200
- Data length of all HMI variables, max.	2 000 Byte
• PROFIBUS proxy functionality	
- supported	Yes
- Number of linked PROFIBUS devices	16
- Data length per connection, max.	240 Byte; Slave-dependent
1st interface	
Physics	RS 485
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
• Transmission speeds, max.	12 MBit/s
DP master	
• Services	
- S7 basic communication	1 blocks only
• Transmission speeds, max.	12 MBit/s
• Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte

2

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-300

CPU 317-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 317-2EK13-0AB0
Product type description	CPU 315-2 PN/DP
DP slave	
• Services	
- Routing	with interface active
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Useful data per address area, max.	32 Byte
2nd interface	
Type of interface	PROFINET
Physics	Ethernet RJ 45
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	0 mA
automatic detection of transmission speed	Yes; (10/100 Mbit/s)
PROFINET IO controller	
• Services	
- PG/OP communication	Yes
- Routing	Yes
- S7 communication	with loadable FBs, max. configurable connections: 16, max. number of instances: 32 via TCP/IP, ISO on TCP and UDP
- open IE communication	
• Transmission speed, max.	100 MBit/s
• Number of connectable IO-devices, max.	128
• Updating time	1 to 512 ms (minimum value depends on communication share set for PROFINET I/O, on the number of I/O devices and on the number of configured net data items)
• Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte
- Useful data consistency, max.	254 Byte

Order No.	6ES7 317-2EK13-0AB0
Product type description	CPU 315-2 PN/DP
CPU/programming	
Programming language	
• STEP 7	V5.4 + SP2 or higher
Nesting levels	8
User program protection/ password protection	Yes
Dimensions	
Width	80 mm
Height	125 mm
Depth	130 mm
Weights	
Weight, approx.	460 g

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-300

CPU 317-2 PN/DP

Ordering data	Order No.	Order No.
CPU 317-2 PN/DP Main memory 1 MB, power supply 24 V DC, combined MPI/PROFIBUS DP master/slave interface, Ethernet/PROFINET interface; MMC required	6ES7 317-2EK13-0AB0	
Micro Memory Card <ul style="list-style-type: none"> • 64 KB • 128 KB • 512 KB • 2 MB • 4 MB • 8 MB 	6ES7 953-8LF20-0AA0 6ES7 953-8LG11-0AA0 6ES7 953-8LJ20-0AA0 6ES7 953-8LL20-0AA0 6ES7 953-8LM20-0AA0 6ES7 953-8LP20-0AA0	
MPI cable For connecting SIMATIC S7 and the PG through MPI; 5 m in length	6ES7 901-0BF00-0AA0	
Slot number plates S7-300 manual Design, CPU data, module data, instruction list <ul style="list-style-type: none"> • German • English • French • Spanish • Italian 	6ES7 912-0AA00-0AA0	
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: S7-200, S7-300, C7, S7-400, SIMATIC DP (distributed I/O), SIMATIC PC, SIMATIC PG (programming devices), STEP 7, Engineering Tools, Runtime Soft- ware, SIMATIC PCS 7, SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Commu- nication), SIMATIC Machine Vision, SIMATIC Sensors	6ES7 998-8XC01-8YE0	
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	6ES7 998-8XC01-8YE2	
Power supply connector 10 units, spare part	6ES7 391-1AA00-0AA0	
Manual "Communication for SIMATIC S7-300/-400" <ul style="list-style-type: none"> • German • English • French • Spanish • Italian 	6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0	
SIMATIC S7 training case With mounting components for mounting S7-200 and S7-300	6ES7 910-3AA00-0XA0	
		PROFIBUS bus components PROFIBUS DP bus connector RS 485 <ul style="list-style-type: none"> • With 90° cable outlet, max. transmission rate 12 Mbit/s - Without PG interface - With PG interface • With 90° cable outlet for FastConnect connection system, max. transmission rate 12 Mbit/s - Without PG interface - With PG interface • With axial cable outlet for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS
		6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0 6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0 6GK1 500-0EA02
		PROFIBUS Fast Connect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m
		6XV1 830-0EH10
		RS 485 repeater for PROFIBUS Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing
		6ES7 972-0AA01-0XA0

2

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 317-2 PN/DP

2

Ordering data (continued)

Order No.

PROFINET bus components

IE FC TP Standard Cable GP 2x2

6XV1 840-2AH10

4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter

FO Standard Cable GP (50/125)

6XV1 873-2A

Standard cable, splittable, UL approval, sold by the meter

Industrial Ethernet Switch SCALANCE X208

6GK5 208-0BA10-2AA3

with eight 10/100 Mbit/s RJ45 ports

Compact Switch Module CSM 377

6GK7 377-1AA00-0AA0

Unmanaged switch for the connection of a SIMATIC S7-300, ET 200M and as many as three other nodes to an Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module incl. electronic equipment manual on CD-ROM

Order No.

IE FC RJ45 plugs

RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables

IE FC RJ45 plug 180

180° cable outlet

- 1 unit
- 10 units
- 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

SIPLUS CPU 317-2 PN/DP
(extended temperature range)

Overview



- The CPU with a large program memory and quantity framework for demanding applications
- Distributed intelligence in Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)
- PROFINET IO-Controller to operate distributed I/Os on PROFINET
- For cross-sector automation tasks in series machine, special machine and plant construction
- Used as central controller in production lines with central and distributed I/O
- For large I/O configuration
- For designing distributed I/O structures
- High processing performance in binary and floating-point arithmetic
- Combined MPI/PROFIBUS DP master/slave interface
- Optionally supports the use of SIMATIC engineering tools

Micro Memory Card required for operation of CPU.

Order No.	6AG1 317-2EK13-2AB0	6AG1 317-2EK13-2AY0
Order No. based on	6ES7 317-2EK13-0AB0	6ES7 317-2EK13-0AB0
Product type description	SIPLUS CPU 317-2 PN/DP	
Ambient temperature range	-25 ... +60 °C; condensation permitted	
Conforms with standard for electronic equipment used on rolling stock (EN 50155)	No	Yes
Environmental conditions	Suited for exceptional medial load (e.g. by chlorine sulfur atmosphere).	
Technical specifications	The technical specifications are identical with those of the based-on modules.	

For further technical documentation on SIPLUS, see:
<http://www.siemens.com/siplus-techdocu>

Ordering data

Order No.

SIPLUS CPU 317-2 PN/DP

Main memory 512 KB,
power supply 24 V DC,
combined MPI/PROFIBUS DP
master/slave interface,
Ethernet/PROFINET interface;
MMC required

- Conforms with the norm for electronic equipment used on rolling stock (EN 50155)

Accessories

6AG1 317-2EK13-2AB0

6AG1 317-2EK13-2AY0

see CPU 317-2 PN/DP
ordering data

PROFINET/Industrial Ethernet

CPU 319-3 PN/DP

CPU 319-3 PN/DP

Overview



- The CPU with high command processing performance, large program memory and quantity framework for demanding applications
- For cross-sector automation tasks in series machine, special machine and plant construction
- Used as central controller in production lines with central and distributed I/O on PROFIBUS and PROFINET
- Distributed intelligence in Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)
- Isochronous mode on PROFIBUS
- Optionally supports the use of SIMATIC engineering tools

Micro Memory Card required for operation of CPU.

Technical specifications

Order No.	6ES7 318-3EL00-0AB0
Product type description	CPU 319-3 PN/DP
Product status	
associated programming package	STEP 7 V5.4 + SP2 or higher
Supply voltages	
Rated value	
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V
Voltages and currents	
external protection for supply cables (recommendation)	Min. 2 A
Current consumption	
Inrush current, typ.	4 A
I^2t	1.2 A ² s
Current consumption (in no-load operation), typ.	400 mA
Current consumption (rated value)	1 050 mA
Power loss, typ.	14 W
Memory	
Type of storage	
• RAM	
- integrated	1 400 KByte
• Load memory	
- pluggable (MMC)	Yes
- pluggable (MMC), max.	8 MByte
Backup	
• present	Yes; up to 700 KB, maintenance-free
• without battery	Yes; Program and data

Order No.	6ES7 318-3EL00-0AB0
Product type description	CPU 319-3 PN/DP
CPU/blocks	
DB	
• Number, max.	4 095; Sequence of numbers: 1 to 4095
• Size, max.	64 KByte
FB	
• Number, max.	2 048; Sequence of numbers: 0 to 2047
• Size, max.	64 KByte
FC	
• Number, max.	2 048; Sequence of numbers: 0 to 2047
• Size, max.	64 KByte
OB	
• Size, max.	64 KByte
Nesting depth	
• per priority class	16
• additional within an error OB	4
CPU/processing times	
for bit operations, min.	0.01 µs
for word operations, min.	0.02 µs
for fixed point arithmetic, min.	0.02 µs
for floating point arithmetic, min.	0.04 µs
Times/counters and their remanence	
S7 counter	
• Number	2 048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2 047
• Counting range	
- adjustable	Yes
- lower limit	0
- upper limit	999

PROFINET/Industrial Ethernet

CPU 319-3 PN/DP

CPU 319-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 318-3EL00-0AB0
Product type description	CPU 319-3 PN/DP
IEC counter	
• present	Yes
• Type	SFB
S7 times	
• Number	2 048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2 047
• Time range	
- lower limit	10 ms
- upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
Flag	
• Number, max.	8 KByte
• Remanence available	Yes; MB 0 to MB 8191
• Number of clock memories	8; 1 memory byte
Data blocks	
• Number, max.	4 095; Number sequence: 1 to 4095
• Size, max.	64 KByte
• Remanence adjustable	Yes; via non-retain property on DB
Local data	
• per priority class, max.	1 024 Byte
Address area	
I/O address area	
• Inputs	8 KByte
• Outputs	8 KByte
• of which, distributed	
- Inputs	8 KByte
- Outputs	8 KByte
Process image	
• Inputs, adjustable	2 KByte
• Outputs, adjustable	2 KByte
• Inputs, preset	256 Byte
• Outputs, preset	256 Byte
Subprocess images	
• Number of subprocess images, max.	1
Digital channels	
• Inputs, of which central	1 024
• Outputs, of which central	1 024
Analog channels	
• Inputs, of which central	256
• Outputs, of which central	256

Order No.	6ES7 318-3EL00-0AB0
Product type description	CPU 319-3 PN/DP
Hardware config.	
Modules per rack, max.	8
Number of DP masters	
• integrated	2
• via CP	4
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Deviation per day, max.	10 s
Operating hours counter	
• Number	4
• Number/Number range	0 to 3
• Range of values	0 to 2 ³¹ hours (when using SFC 101)
• Granularity	1 hour
• remanent	Yes
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes
• on Ethernet via NTP	Yes; as client
S7 message functions	
Number of login stations for message functions, max.	32
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	60
Test commissioning functions	
Status/control	
• Variables	Inputs, outputs, memory bits, DB, times, counters
Forcing	
• Force, variables	Inputs, outputs
Diagnostic buffer	
• Number of entries, max.	500

2

PROFINET/Industrial Ethernet

CPU 319-3 PN/DP

CPU 319-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 318-3EL00-0AB0
Product type description	CPU 319-3 PN/DP
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	22 Byte
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
S5-compatible communication	
• supported	Yes; via CP and loadable FC
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	1 460 Byte; with connection type 01H; 8192 bytes with connection type 11H
• ISO-on-TCP (RFC1006)	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	8 192 Byte
• UDP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	1 472 Byte
Number of connections	
• overall	32
• usable for PG communication	31
• usable for OP communication	31
• usable for S7 basic communication	30
PROFINET CBA (at set setpoint communication load)	
• PROFIBUS proxy functionality	
- Data length per connection, max.	Slave-dependent

Order No.	6ES7 318-3EL00-0AB0
Product type description	CPU 319-3 PN/DP
1st interface	
Physics	RS 485
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
• Transmission speeds, max.	12 MBit/s
DP master	
• Services	
- S7 basic communication	I blocks only
• Transmission speeds, max.	12 MBit/s
• Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
DP slave	
• Services	
- Routing	with interface active
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Useful data per address area, max.	32 Byte

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 319-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 318-3EL00-0AB0
Product type description	CPU 319-3 PN/DP
2nd interface	
Physics	RS 485
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
DP master	
• Services	
- S7 basic communication	I blocks only
- Isochronous mode	OB 61
• Transmission speeds, max.	12 MBit/s
• Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
DP slave	
• Services	
- Routing	with interface active
• Transmission speeds, max.	12 MBit/s
• automatic baud rate search	Yes; only with passive interface
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Useful data per address area, max.	32 Byte

Order No.	6ES7 318-3EL00-0AB0
Product type description	CPU 319-3 PN/DP
3rd interface	
Type of interfaces	PROFINET
Physics	Ethernet RJ45
isolated	Yes
automatic detection of transmission speed	Yes
Functionality	
• MPI	No
• PROFINET IO controller	Yes
• PROFINET IO device	No
• PROFINET CBA	Yes
• Point-to-point coupling	No
Open IE communication	
• Number of connections, max.	8
PROFINET CBA (at 50 % communication load)	
• Acyclic transmission	Yes
• cyclic transmission	Yes
Nesting levels	8
User program protection/password protection	Yes
Dimensions	
Width	120 mm
Height	125 mm
Depth	130 mm
Weights	
Weight, approx.	1 250 g

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 319-3 PN/DP

2

Ordering data

Order No.

Order No.

CPU 319-3 PN/DP

Main memory 1.4 MB, power supply 24 V DC, combined MPI/PROFIBUS DP master/slave interface, PROFIBUS DP master/slave interface, Ethernet/PROFINET interface; MMC required

6ES7 318-3EL00-0AB0

Micro Memory Card

- 64 KB
- 128 KB
- 512 KB
- 2 MB
- 4 MB
- 8 MB

6ES7 953-8LF20-0AA0

6ES7 953-8LG11-0AA0

6ES7 953-8LJ20-0AA0

6ES7 953-8LL20-0AA0

6ES7 953-8LM20-0AA0

6ES7 953-8LP20-0AA0

MPI cable

For connecting SIMATIC S7 and the PG through MPI; 5 m in length

6ES7 901-0BF00-0AA0

Slot number plates

6ES7 912-0AA00-0AA0

S7-300 manual

Design, CPU data, module data, instruction list

- German
- English
- French
- Spanish
- Italian

6ES7 398-8FA10-8AA0

6ES7 398-8FA10-8BA0

6ES7 398-8FA10-8CA0

6ES7 398-8FA10-8DA0

6ES7 398-8FA10-8EA0

SIMATIC Manual Collection

Electronic manuals on DVD, multi-lingual: S7-200, S7-300, C7, S7-400, SIMATIC DP (distributed I/O), SIMATIC PC, SIMATIC PG (programming devices), STEP 7, Engineering Tools, Runtime Software, SIMATIC PCS 7, SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication), SIMATIC Machine Vision, SIMATIC Sensors

6ES7 998-8XC01-8YE0

SIMATIC Manual Collection update service for 1 year

Current "Manual Collection" DVD and the three subsequent updates

6ES7 998-8XC01-8YE2

Power supply connector

10 units, spare part

6ES7 391-1AA00-0AA0

Manual "Communication for SIMATIC S7-300/-400"

- German
- English
- French
- Spanish
- Italian

6ES7 398-8EA00-8AA0

6ES7 398-8EA00-8BA0

6ES7 398-8EA00-8CA0

6ES7 398-8EA00-8DA0

6ES7 398-8EA00-8EA0

SIMATIC S7 training case

With mounting components for mounting S7-200 and S7-300

6ES7 910-3AA00-0XA0

PROFIBUS bus components

PROFIBUS DP bus connector RS 485

- With 90° cable outlet, max. transmission rate 12 Mbit/s
 - Without PG interface
 - With PG interface
- With 90° cable outlet for FastConnect connection system, max. transmission rate 12 Mbit/s
 - Without PG interface
 - With PG interface
- With axial cable outlet for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS

6ES7 972-0BA12-0XA0

6ES7 972-0BB12-0XA0

6ES7 972-0BA51-0XA0

6ES7 972-0BB51-0XA0

6GK1 500-0EA02

PROFIBUS Fast Connect bus cable

Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m

6XV1 830-0EH10

RS 485 repeater for PROFIBUS

Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing

6ES7 972-0AA01-0XA0

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 319-3 PN/DP

Ordering data (continued)	Order No.		Order No.
PROFINET bus components		IE FC RJ45 plugs	
IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10	RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A	IE FC RJ45 Plug 180 180° cable outlet • 1 unit • 10 units • 50 units	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0
Industrial Ethernet Switch SCALANCE X208 with eight 10/100 Mbit/s RJ45 ports	6GK5 208-0BA10-2AA3		
Compact Switch Module CSM 377 Unmanaged switch for the connection of a SIMATIC S7-300, ET 200M and as many as three other nodes to an Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module incl. electronic equipment manual on CD-ROM	6GK7 377-1AA00-0AA0		

2

PROFINET/Industrial Ethernet

CPU 315F-2 PN/DP

CPU 315F-2 PN/DP

Overview



- For design of a fail-safe automation system for plants with increased safety requirements
- Complies with safety requirements up to SIL 3 to IEC 61508 and up to Cat. 4 according to EN 954-1
- Fail-safe I/O modules in distributed stations can be connected through the integrated PROFINET interface (PROFIsafe) and/or through the integrated PROFIBUS DP interface (PROFIsafe);
- Fail-safe I/O modules of the ET 200M range can also be centrally connected
- Central and distributed use of standard modules for non safety-relevant applications
- Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)

Micro Memory Card required for operation of CPU.

Technical specifications

Order No.	6ES7 315-2FH13-0AB0
Product type description	CPU 315F-2 PN/DP
Product status	
associated programming package	STEP 7 V5.4 SP2 or higher S7 Distributed Safety V5.4 or higher
Supply voltages	
Rated value	
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V
Current consumption	
Inrush current, typ.	2.5 A
I ² t	1 A ² s
Current consumption (in no-load operation), typ.	100 mA
Current consumption (rated value)	650 mA
Power loss, typ.	3.5 W
Memory	
Type of storage	
• RAM	256 KByte; For program and data
- integrated	
• Load memory	
- pluggable (MMC)	Yes
- pluggable (MMC), max.	8 MByte
- expandable FEPRM	can be plugged in as MMC
Backup	
• present	Yes
• without battery	Yes; Program and data

Order No.	6ES7 315-2FH13-0AB0
Product type description	CPU 315F-2 PN/DP
CPU/blocks	
DB	
• Number, max.	1 023; Number band: 1 to 1023
• Size, max.	16 KByte
FB	
• Number, max.	1 024; Sequence of numbers: 0 to 2047
• Size, max.	16 KByte
FC	
• Number, max.	1 024; Sequence of numbers: 0 to 2047
• Size, max.	16 KByte
OB	
• Size, max.	16 KByte
Nesting depth	
• per priority class	8
• additional within an error OB	4
CPU/processing times	
for bit operations, min.	0.1 µs
for word operations, min.	0.2 µs
for fixed point arithmetic, min.	2 µs
for floating point arithmetic, min.	3 µs

PROFINET/Industrial Ethernet

CPU 315F-2 PN/DP

CPU 315F-2 PN/DP

2

Technical specifications (continued)

Order No.	6ES7 315-2FH13-0AB0
Product type description	CPU 315F-2 PN/DP
Times/counters and their remanence	
S7 counter	
• Number	256
• of which remanent without battery	
- adjustable	Yes
- lower limit	0
- upper limit	255
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	255
• Counting range	
- adjustable	Yes
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB
S7 times	
• Number	256
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	255
• Time range	
- lower limit	10 ms
- upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
Flag	
• Number, max.	2 048 Byte
• Remanence available	Yes; MB 0 to MB 2047
• Number of clock memories	8; 1 memory byte
Data blocks	
• Number, max.	1 023; From DB 1 to DB 1023
• Size, max.	16 KByte
• Remanence adjustable	Yes; via non-retain property on DB
• Remanence preset	yes
Local data	
• per priority class, max.	1 024 Byte; per block max. 510

Order No.	6ES7 315-2FH13-0AB0
Product type description	CPU 315F-2 PN/DP
Address area	
I/O address area	
• Inputs	2 KByte
• Outputs	2 KByte
• of which, distributed	
- Inputs	2 KByte
- Outputs	2 KByte
Process image	
• Inputs	384 Byte
• Outputs	384 Byte
Digital channels	
• Inputs, of which central	1 024; max.
• Outputs, of which central	1 024; max.
Analog channels	
• Inputs, of which central	256; max.
• Outputs, of which central	256; max.
Hardware config.	
Modules per rack, max.	8
Number of DP masters	
• integrated	1
• via CP	4
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Deviation per day, max.	10 s
Operating hours counter	
• Number	1
• Number/Number range	0
• Range of values	2 ³¹ hours (when using the SFC 101)
• Granularity	1 hour
• remanent	Yes
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes
S7 message functions	
Number of login stations for message functions, max.	16
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	40

PROFINET/Industrial Ethernet

CPU 315F-2 PN/DP

CPU 315F-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 315-2FH13-0AB0
Product type description	CPU 315F-2 PN/DP
Test commissioning functions	
Status/control	
• Variables	Inputs, outputs, memory bits, DB, times, counters
Forcing	
• Force, variables	Inputs, outputs
Diagnostic buffer	
• Number of entries, max.	100
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	22 Byte
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
S5-compatible communication	
• supported	Yes; via CP and loadable FC
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	1 460 Byte
Number of connections	
• overall	16
• usable for PG communication	15; max.
• usable for OP communication	15
• usable for S7 basic communication	14
• usable for routing	X1 as MPI: max. 10; X1 as DP master: max. 24; X1 as DP slave (active): max. 14; X2 as PROFINET: max. 24
PROFINET CBA (at set setpoint communication load)	
• Setpoint for the CPU communication load	50%
• Number of remote interconnection partners	32
• Number of functions, master/slave	17
• Total of all master/slave connections	1 000
• Data length of all incoming connections master/slave, max.	4 000 Byte
• Data length of all outgoing connections master/slave, max.	4 000 Byte
• Number of device-internal and PROFIBUS interconnections	500
• Data length of device-internal and PROFIBUS interconnections, max.	4 000 Byte
• Data length per connection, max.	1 400 Byte

Order No.	6ES7 315-2FH13-0AB0
Product type description	CPU 315F-2 PN/DP
• Remote interconnections with acyclic transmission	
- Sampling frequency: sampling interval, min.	500 ms
- Number of incoming interconnections	100
- Number of outgoing interconnections	100
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	1 400 Byte
• Remote interconnections with cyclic transmission	
- Transmission frequency: transmission interval, min.	10 ms
- Number of incoming interconnections	200
- Number of outgoing interconnections	200
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	450 Byte
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	3; 2x PN OPC/1x iMap
- HMI variable updating	500 ms
- Number of HMI variables	200
- Data length of all HMI variables, max.	2 000 Byte
• PROFIBUS proxy functionality	
- supported	Yes
- Number of linked PROFIBUS devices	16
- Data length per connection, max.	240 Byte; Slave-dependent
PROFINET CBA (at 50 % communication load)	
• Data length for arrays and structures (local interconnection), max.	Slave-dependent
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	2 * PN OPC / 1 * iMap

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 315F-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 315-2FH13-0AB0
Product type description	CPU 315F-2 PN/DP
1st interface	
Physics	RS 485
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
• Transmission speeds, max.	12 MBit/s
• Transmission speeds, max.	12 MBit/s
DP slave	
• Services	
- Routing	only with active interface
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Address area, max.	with max. 32 bytes each
2nd interface	
Type of interface	PROFINET
Physics	Ethernet
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	0 mA
automatic detection of transmission speed	Yes; (10/100 Mbit/s)
PROFINET IO controller	
• Services	
- PG/OP communication	Yes
- Routing	Yes
- S7 communication	with loadable FBs, max. configurable connections: 14, max. number of instances: 32 via TCP/IP
- open IE communication	
• Transmission speed, max.	100 MBit/s
• Number of connectable IO-devices, max.	128
• Updating time	1 to 512 ms (minimum value depends on communication share set for PROFINET I/O, on the number of I/O devices and on the number of configured net data items)
• Address area	
- Inputs, max.	2 KByte
- Outputs, max.	2 KByte
- Useful data consistency, max.	256 Byte

Order No.	6ES7 315-2FH13-0AB0
Product type description	CPU 315F-2 PN/DP
CPU/programming	
Programming language	
• STEP 7	V5.3 SP3 or higher with hardware update
Nesting levels	8
User program protection/password protection	Yes
Dimensions	
Width	80 mm
Height	125 mm
Depth	130 mm
Weights	
Weight, approx.	460 g

2

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 315F-2 PN/DP

2

Ordering data	Order No.	Order No.
CPU 315F-2 PN/DP CPU for SIMATIC S7-300F; main memory 256 KB, power supply 24 V DC, MPI/PROFIBUS DP master/slave interface, Industrial Ethernet/ PROFINET interface; incl. slot number labels	6ES7 315-2FH13-0AB0	PROFIBUS DP bus connector RS 485 <ul style="list-style-type: none"> With 90° cable outlet, max. transmission rate 12 Mbit/s <ul style="list-style-type: none"> Without PG interface With PG interface With 90° cable outlet for FastConnect connection system, max. transmission rate 12 Mbit/s <ul style="list-style-type: none"> Without PG interface With PG interface With axial cable outlet for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS 6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0 6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0 6GK1 500-0EA02
Distributed Safety V5.4 pro- gramming tool Task: Software for configuring fail- safe user programs for SIMATIC S7-300F, S7-400F, ET 200S Requirement: STEP 7 V5.3 SP3 and higher Floating License Software Update Service	6ES7 833-1FC02-0YA5 6ES7 833-1FC00-0YX2	
Distributed Safety Upgrade From V5.x to V5.4; Floating License for 1 user	6ES7 833-1FC02-0YE5	
Micro Memory Card <ul style="list-style-type: none"> 64 KB 128 KB 512 KB 2 MB 4 MB 8 MB 	6ES7 953-8LF20-0AA0 6ES7 953-8LG11-0AA0 6ES7 953-8LJ20-0AA0 6ES7 953-8LL20-0AA0 6ES7 953-8LM20-0AA0 6ES7 953-8LP20-0AA0	
MPI cable For connecting SIMATIC S7 and the PG through MPI; 5 m in length	6ES7 901-0BF00-0AA0	
Slot number plates	6ES7 912-0AA00-0AA0	
S7-300 manual Design, CPU data, module data, instruction list <ul style="list-style-type: none"> German English French Spanish Italian 	6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0	
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: S7-200, S7-300, C7, S7-400, SIMATIC DP (distributed I/O), SIMATIC PC, SIMATIC PG (programming devices), STEP 7, Engineering Tools, Runtime Soft- ware, SIMATIC PCS 7, SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Commu- nication), SIMATIC Machine Vision, SIMATIC Sensors	6ES7 998-8XC01-8YE0	
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	6ES7 998-8XC01-8YE2	
Power supply connector 10 units, spare part	6ES7 391-1AA00-0AA0	
Manual "Communication for SIMATIC S7-300/-400" <ul style="list-style-type: none"> German English French Spanish Italian 	6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0	PROFIBUS Fast Connect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m RS 485 repeater for PROFIBUS Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 315F-2 PN/DP

Ordering data (continued)	Order No.		Order No.
PROFINET bus components		IE FC RJ45 plugs	
IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10	RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A	IE FC RJ45 Plug 180 180° cable outlet • 1 unit • 10 units • 50 units	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0
Industrial Ethernet Switch SCALANCE X208 with eight 10/100 Mbit/s RJ45 ports	6GK5 208-0BA10-2AA3		
Compact Switch Module CSM 377 Unmanaged switch for the connection of a SIMATIC S7-300, ET 200M and as many as three other nodes to an Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module incl. electronic equipment manual on CD-ROM	6GK7 377-1AA00-0AA0		

2

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

SIPLUS CPU 315F-2 PN/DP (extended temperature range)

Overview



- For design of a fail-safe automation system for plants with increased safety requirements
- Satisfies safety requirements up to SIL 3 acc. to IEC 61508 and up to Cat. 4 acc. to EN 954-1
- Fail-safe I/O modules in distributed stations can be connected through the integrated PROFINET interface (PROFIsafe) and/or through the integrated PROFIBUS DP interface (PROFIsafe);
- Fail-safe I/O modules of the ET 200M range can also be centrally connected
- Standard modules for non-safety-related applications can be operated centrally and decentralized
- Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)

Micro Memory Card required for operation of CPU.

Order No.	6AG1 315-2FH13-2AB0
Order No. based on	6ES7 315-2FH13-0AB0
Product type description	SIPLUS CPU 315F-2 PN/DP
Ambient temperature range	- 25 ... + 60 °C; condensation permitted
Ambient conditions	Suited for exceptional medial load (e. g. by chlorine sulfur atmo- sphere).
Technical specifications	The technical specifications is identical to that of the based-on modules.

Ordering data

CPU 317F-2 PN/DP (extended temperature range and medial exposure)

CPU for SIMATIC S7-300F;
main memory 256 KB,
power supply 24 VDC,
MPI/PROFIBUS DP master/slave
interface, Industrial Ethernet/
PROFINET interface; MMC
required

Accessories

Order No.

6AG1 315-2FH13-2AB0

see CPU 315F-2 PN/DP
ordering data

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 317F-2 PN/DP

Overview



- The fail-safe CPU with a large program memory and quantity framework for demanding applications
- For design of a fail-safe automation system for plants with increased safety requirements
- Complies with safety requirements up to SIL 3 to IEC 61508 and up to Cat. 4 according to EN 954-1
- Fail-safe I/O modules in distributed stations can be connected through the integrated PROFINET interface (PROFIsafe) and/or through the integrated PROFIBUS DP interface (PROFIsafe)
- Fail-safe I/O modules of the ET 200M range can also be centrally connected
- Central and distributed use of standard modules for non safety-relevant applications
- Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)

Micro Memory Card required for operation of CPU.

Technical specifications

Order No.	6ES7 317-2FK13-0AB0
Product type description	CPU 317F-2 PN/DP
Product status	
associated programming package	STEP 7 V5.4 SP2 or higher, S7 Distributed Safety V5.4 or higher
Supply voltages	
Rated value	
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V
Current consumption	
Inrush current, typ.	2.5 A
I^2t	1 A ² s
Current consumption (in no-load operation), typ.	100 mA
Current consumption (rated value)	650 mA
Power loss, typ.	3.5 W
Memory	
Type of storage	
• RAM	
- integrated	1 MByte; For program and data
• Load memory	
- pluggable (MMC)	Yes
- pluggable (MMC), max.	8 MByte
Backup	
• present	Yes
• without battery	Yes; Program and data

Order No.	6ES7 317-2FK13-0AB0
Product type description	CPU 317F-2 PN/DP
CPU/blocks	
DB	
• Number, max.	2 047; Number band: 1 to 2047
• Size, max.	64 KByte
FB	
• Number, max.	2 048; Sequence of numbers: 0 to 2047
• Size, max.	64 KByte
FC	
• Number, max.	2 048; Sequence of numbers: 0 to 2047
• Size, max.	64 KByte
OB	
• Size, max.	64 KByte
Nesting depth	
• per priority class	16
• additional within an error OB	4
CPU/processing times	
for bit operations, min.	0.05 µs
for word operations, min.	0.2 µs
for fixed point arithmetic, min.	0.2 µs
for floating point arithmetic, min.	1 µs

PROFINET/Industrial Ethernet

CPU 317F-2 PN/DP

CPU 317F-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 317-2FK13-0AB0
Product type description	CPU 317F-2 PN/DP
Times/counters and their remanence	
S7 counter	
• Number	512
• of which remanent without battery	
- adjustable	Yes
- lower limit	0
- upper limit	511
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	511
• Counting range	
- adjustable	Yes
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB
S7 times	
• Number	512
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	511
• Time range	
- lower limit	10 ms
- upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
Flag	
• Number, max.	4 096 Byte
• Remanence available	Yes; MB 0 to MB 4095
• Number of clock memories	8; 1 memory byte
Data blocks	
• Number, max.	2 047; from DB 1 to DB 2047
• Size, max.	64 KByte
• Remanence adjustable	Yes; via non-retain property on DB
• Remanence preset	yes
Local data	
• per priority class, max.	1 024 Byte

Order No.	6ES7 317-2FK13-0AB0
Product type description	CPU 317F-2 PN/DP
Address area	
I/O address area	
• Inputs	8 KByte
• Outputs	8 KByte
• of which, distributed	
- Inputs	8 KByte
- Outputs	8 KByte
Process image	
• Inputs	2 048 Byte
• Outputs	2 048 Byte
• Inputs, adjustable	2 048 Byte
• Outputs, adjustable	2 048 Byte
• Inputs, preset	1 024 Byte
• Outputs, preset	1 024 Byte
Digital channels	
• Inputs, of which central	1 024
• Outputs, of which central	1 024
Analog channels	
• Inputs, of which central	256
• Outputs, of which central	256
Hardware config.	
Modules per rack, max.	8
Number of DP masters	
• integrated	1
• via CP	4
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Deviation per day, max.	10 s
Operating hours counter	
• Number	4
• Number/Number range	0 to 3
• Range of values	0 to 2 ³¹ hours (when using SFC 101)
• Granularity	1 hour
• remanent	Yes
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 317F-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 317-2FK13-0AB0
Product type description	CPU 317F-2 PN/DP
S7 message functions	
Number of login stations for message functions, max.	32
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	60
Test commissioning functions	
Status/control	
• Variables	Inputs, outputs, memory bits, DB, times, counters
Forcing	
• Force, variables	Inputs, outputs
Diagnostic buffer	
• Number of entries, max.	100
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	22 Byte
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
S5-compatible communication	
• supported	Yes; via CP and loadable FC
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	1 460 Byte
Number of connections	
• overall	32
• usable for PG communication	31
• usable for OP communication	31
• usable for S7 basic communication	30
PROFINET CBA (at set setpoint communication load)	
• Setpoint for the CPU communication load	50%
• Number of remote i nterconnection partners	32
• Number of functions, master/slave	17
• Total of all master/slave connections	1 000
• Data length of all incoming connections master/slave, max.	4 000 Byte
• Data length of all outgoing connections master/slave, max.	4 000 Byte
• Number of device-internal and PROFIBUS interconnections	500
• Data length of device-internal and PROFIBUS interconnections, max.	4 000 Byte
• Data length per connection, max.	1 400 Byte

Order No.	6ES7 317-2FK13-0AB0
Product type description	CPU 317F-2 PN/DP
• Remote interconnections with acyclic transmission	
- Sampling frequency: sampling interval, min.	500 ms
- Number of incoming interconnections	100
- Number of outgoing interconnections	100
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	1 400 Byte
• Remote interconnections with cyclic transmission	
- Transmission frequency: transmission interval, min.	10 ms
- Number of incoming interconnections	200
- Number of outgoing interconnections	200
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	450 Byte
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	3; 2x PN OPC/1x iMap
- HMI variable updating	500 ms
- Number of HMI variables	200
- Data length of all HMI variables, max.	2 000 Byte
• PROFIBUS proxy functionality	
- supported	Yes
- Number of linked PROFIBUS devices	16
- Data length per connection, max.	240 Byte; Slave-dependent
PROFINET CBA (at 50 % communication load)	
• Data length for arrays and structures (local interconnection), max.	Slave-dependent
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	2 * PN OPC / 1 * iMap

2

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-300

CPU 317F-2 PN/DP

Technical specifications (continued)

Order No.	6ES7 317-2FK13-0AB0
Product type description	CPU 317F-2 PN/DP
1st interface	
Physics	RS 485
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
• Transmission speeds, max.	12 MBit/s
• Transmission speeds, max.	12 MBit/s
DP slave	
• Services	with interface active
- Routing	
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Useful data per address area, max.	32 Byte
2nd interface	
Type of interface	PROFINET
Physics	Ethernet
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	0 mA
automatic detection of transmission speed	Yes; (10/100 Mbit/s)
Functionality	
• PROFINET IO controller	Firmware Status V2.3 or higher
PROFINET IO controller	
• Services	
- PG/OP communication	Yes
- Routing	Yes
- S7 communication	with loadable FBs, max. configurable connections: 16, max. number of instances: 32 via TCP/IP
- open IE communication	
• Transmission speed, max.	100 MBit/s
• Number of connectable IO-devices, max.	128
• Updating time	1 to 512 ms (minimum value depends on communication share set for PROFINET I/O, on the number of I/O devices and on the number of configured net data items)
• Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte
- Useful data consistency, max.	256 Byte

Order No.	6ES7 317-2FK13-0AB0
Product type description	CPU 317F-2 PN/DP
CPU/programming	
Programming language	
• STEP 7	V5.3 SP3 or higher with hardware update
Nesting levels	8
User program protection/ password protection	Yes
Dimensions	
Width	80 mm
Height	125 mm
Depth	130 mm
Weights	
Weight, approx.	460 g

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-300

CPU 317F-2 PN/DP

2

Ordering data	Order No.		Order No.
CPU 317F-2 PN/DP Main memory 1024 KB, 24 V DC supply voltage, MPI/PROFIBUS DP master/slave interface, Industrial Ethernet/ PROFINET interface; MMC required	6ES7 317-2FK13-0AB0	SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	6ES7 998-8XC01-8YE2
Distributed Safety V5.4 programming tool Task: Software for configuring fail-safe user programs for SIMATIC S7-300F, S7-400F, ET 200S Requirement: STEP 7 V5.3 SP3 and higher Floating License Software Update Service	 6ES7 833-1FC02-0YA5 6ES7 833-1FC00-0YX2	Power supply connector 10 units, spare part	6ES7 391-1AA00-0AA0
Distributed Safety Upgrade From V5.x to V5.4; Floating License for 1 user	6ES7 833-1FC02-0YE5	Manual "Communication for SIMATIC S7-300/-400" • German • English • French • Spanish • Italian	 6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0
Micro Memory Card • 64 KB • 128 KB • 512 KB • 2 MB • 4 MB • 8 MB	 6ES7 953-8LF20-0AA0 6ES7 953-8LG11-0AA0 6ES7 953-8LJ20-0AA0 6ES7 953-8LL20-0AA0 6ES7 953-8LM20-0AA0 6ES7 953-8LP20-0AA0	PROFIBUS DP bus connector RS 485 • With 90° cable outlet, max. transmission rate 12 Mbit/s - Without PG interface - With PG interface • With 90° cable outlet for FastConnect connection system, max. transmission rate 12 Mbit/s - Without PG interface - With PG interface • With axial cable outlet for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS	 6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0 6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0 6GK1 500-0EA02
MPI cable For connecting SIMATIC S7 and the PG through MPI; 5 m in length	6ES7 901-0BF00-0AA0	PROFIBUS Fast Connect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m	6XV1 830-0EH10
Slot number plates	6ES7 912-0AA00-0AA0	RS 485 repeater for PROFIBUS Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing	6ES7 972-0AA01-0XA0
S7-300 manual Design, CPU data, module data, instruction list • German • English • French • Spanish • Italian	 6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0		
SIMATIC Manual Collection Electronic manuals on DVD, multilingual: S7-200, S7-300, C7, S7-400, SIMATIC DP (distributed I/O), SIMATIC PC, SIMATIC PG (programming devices), STEP 7, Engineering Tools, Runtime Soft- ware, SIMATIC PCS 7, SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Commu- nication), SIMATIC Machine Vision, SIMATIC Sensors	6ES7 998-8XC01-8YE0		

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-300

CPU 317F-2 PN/DP

2

Ordering data (continued)

Order No.

PROFINET bus components

IE FC TP Standard Cable GP 2x2

4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter

6XV1 840-2AH10

FO Standard Cable GP (50/125)

Standard cable, splittable, UL approval, sold by the meter

6XV1 873-2A

Industrial Ethernet Switch SCALANCE X208

with eight 10/100 Mbit/s RJ45 ports

6GK5 208-0BA10-2AA3

Compact Switch Module CSM 377

Unmanaged switch for the connection of a SIMATIC S7-300, ET 200M and as many as three other nodes to an Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module incl. electronic equipment manual on CD-ROM

6GK7 377-1AA00-0AA0

Order No.

IE FC RJ45 plugs

RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables

IE FC RJ45 Plug 180

180° cable outlet

- 1 unit
- 10 units
- 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

SIPLUS CPU 317F-2 PN/DP
(extended temperature range)

Overview



- The fail-safe CPU with a large program memory and quantity framework for demanding applications
- For design of a fail-safe automation system for plants with increased safety requirements
- Satisfies safety requirements up to SIL 3 acc. to IEC 61508 and up to Cat. 4 acc. to EN 954-1
- Fail-safe I/O modules can be connected decentralized over the integrated PROFINET interface (PROFIsafe) and/or over the integrated PROFIBUS DP interface (PROFIsafe);
- Fail-safe I/O modules of ET200M can also be connected centrally
- Standard modules for non-safety-related applications can be operated centrally and decentralized
- Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)

Micro Memory Card required for operation of CPU.

Order No.	6AG1 317-2FK13-2AB0
Order No. based on	6ES7317-2FK13-0AB0
Product type description	SIPLUS CPU 317F-2 PN/DP
Ambient temperature range	- 25 ... + 60 °C; condensation permitted
Ambient conditions	Suited for exceptional medial load (e. g. by chlorine sulfur atmosphere).
Technical specifications	The technical specifications is identical to that of the based-on modules.

Ordering data

CPU 317F-2 PN/DP (extended temperature range and medial exposure)

Main memory 1024 KB,
24 V DC supply voltage,
MPI/PROFIBUS DP master/slave
interface, Industrial Ethernet/
PROFINET interface;
MMC required

Accessories

Order No.

6AG1 317-2FK13-2AB0

see CPU 317F-2 PN/DP
ordering data

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 319F-3 PN/DP

Overview



- The fail-safe CPU with high-performance command processing, large program memory and large quantity structure for demanding applications
- For constructing a fail-safe automation system for plants with increased safety requirements
- Satisfies safety requirements up to SIL 3 acc. to IEC 61508 and up to Cat. 4 acc. to EN 954-1
- Fail-safe I/O modules can be connected decentralized over the integrated PROFINET interface (PROFIsafe) and/or over the integrated PROFIBUS DP interface (PROFIsafe)
- Fail-safe I/O modules of ET200M can also be connected centrally
- Standard modules for non-safety-related applications can be operated centrally and decentralized
- Distributed intelligence in Component Based Automation (CBA) on PROFINET
- Isochronous mode on PROFIBUS
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)

Micro Memory Card required for operation of CPU.

Technical specifications

Order No.	6ES7 318-3FL00-0AB0
Product type description	CPU 319F-3 PN/DP
Product status	
associated programming package	STEP 7 V5.4 or higher, Service Pack 2 with HSP 143
Supply voltages	
Rated value	
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V
Voltages and currents	
external protection for supply cables (recommendation)	Min. 2 A
Current consumption	
Inrush current, typ.	4 A
I^2t	1.2 A²s
Current consumption (in no-load operation), typ.	400 mA
Current consumption (rated value)	1 050 mA
Power loss, typ.	14 W
Memory	
Type of storage	
• RAM	1 400 KByte
• Load memory	
- integrated	Yes
- pluggable (MMC)	8 MByte
- pluggable (MMC), max.	
Backup	
• present	Yes
• without battery	Yes; Program and data

Order No.	6ES7 318-3FL00-0AB0
Product type description	CPU 319F-3 PN/DP
CPU/blocks	
DB	
• Number, max.	4 095; DB 0 reserved
• Size, max.	64 KByte
FB	
• Number, max.	2 048; from FB 0 to FB 2047
• Size, max.	64 KByte
FC	
• Number, max.	2 048; from FC 0 to FC 2047
• Size, max.	64 KByte
OB	
• Size, max.	64 KByte
Nesting depth	
• per priority class	16
• additional within an error OB	4
CPU/processing times	
for bit operations, min.	0.01 µs
for word operations, min.	0.02 µs
for fixed point arithmetic, min.	0.02 µs
for floating point arithmetic, min.	0.1 µs

Technical specifications (continued)

Order No.	6ES7 318-3FL00-0AB0
Product type description	CPU 319F-3 PN/DP
Times/counters and their remanence	
S7 counter	
• Number	2 048
• Remanence	
- adjustable	Yes
• Counting range	
- adjustable	Yes
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB
S7 times	
• Number	2 048
• Remanence	
- adjustable	Yes
• Time range	
- lower limit	10 ms
- upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
Flag	
• Number, max.	8 KByte
• Remanence available	Yes; MB 0 to MB 8191
• Number of clock memories	8; 1 memory byte
Data blocks	
• Number, max.	4 095; from DB 1 to DB 4095
• Size, max.	64 KByte
• Remanence adjustable	Yes; via non-retain property on DB yes
• Remanence preset	
Local data	
• per priority class, max.	1 024 Byte
Address area	
I/O address area	
• Inputs	8 KByte
• Outputs	8 KByte
• of which, distributed	
- Inputs	8 KByte
- Outputs	8 KByte
Process image	
• Inputs, adjustable	2 KByte
• Outputs, adjustable	2 KByte
• Inputs, preset	1 024 Byte
• Outputs, preset	1 024 Byte

Order No.	6ES7 318-3FL00-0AB0
Product type description	CPU 319F-3 PN/DP
Subprocess images	
• Number of subprocess images, max.	1
Digital channels	
• Inputs, of which central	1 024
• Outputs, of which central	1 024
Analog channels	
• Inputs, of which central	256
• Outputs, of which central	256
Hardware config.	
Modules per rack, max.	8
Number of DP masters	
• integrated	2
• via CP	4
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Deviation per day, max.	10 s
Operating hours counter	
• Number	4
• Number/Number range	0 to 3
• Range of values	0 to 2 ³¹ hours (when using SFC 101)
• Granularity	1 hour
• remanent	Yes; Must be restarted at each restart
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• to DP, Master	Yes
• to DP, Slave	Yes; on DP slave only time-of-day slave
• in AS, Master	Yes
• in AS, Slave	Yes
• on Ethernet via NTP	Yes; as client
S7 message functions	
Number of login stations for message functions, max.	32
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	60
Test commissioning functions	
Status/control	
• Variables	Inputs, outputs, memory bits, DB, times, counters
Forcing	
• Force, variables	Inputs, outputs
Diagnostic buffer	
• Number of entries, max.	500

PROFINET/Industrial Ethernet

CPU 319F-3 PN/DP

CPU 319F-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 318-3FL00-0AB0
Product type description	CPU 319F-3 PN/DP
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	22 Byte
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
S5-compatible communication	
• supported	Yes; via CP and loadable FC
Open IE communication	
• TCP/IP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	1 460 Byte
• ISO-on-TCP (RFC1006)	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	8 192 Byte
• UDP	Yes; via integrated PROFINET interface and loadable FBs
- Number of connections, max.	8
- Data length, max.	1 472 Byte
Number of connections	
• overall	32
• usable for PG communication	31
• usable for OP communication	31
• usable for S7 basic communication	30
PROFINET CBA (at set setpoint communication load)	
• Setpoint for the CPU communication load	20%
• Number of remote interconnection partners	32
• Number of functions, master/slave	50
• Total of all master/slave connections	3 000
• Data length of all incoming connections master/slave, max.	24 000 Byte
• Data length of all outgoing connections master/slave, max.	24 000 Byte
• Number of device-internal and PROFIBUS interconnections	1 000
• Data length of device-internal and PROFIBUS interconnections, max.	8 000 Byte
• Data length per connection, max.	1 400 Byte

Order No.	6ES7 318-3FL00-0AB0
Product type description	CPU 319F-3 PN/DP
• Remote interconnections with acyclic transmission	
- Sampling frequency: sampling interval, min.	200 ms
- Number of incoming interconnections	100
- Number of outgoing interconnections	100
- Data length of all incoming interconnections, max.	3 200 Byte
- Data length of all outgoing interconnections, max.	3 200 Byte
- Data length per connection, max.	1 400 Byte
• Remote interconnections with cyclic transmission	
- Transmission frequency: transmission interval, min.	1 ms
- Number of incoming interconnections	300
- Number of outgoing interconnections	300
- Data length of all incoming interconnections, max.	4 800 Byte
- Data length of all outgoing interconnections, max.	4 800 Byte
- Data length per connection, max.	250 Byte
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	3
- HMI variable updating	500 ms
- Number of HMI variables	600
- Data length of all HMI variables, max.	9 600 Byte
• PROFIBUS proxy functionality	
- supported	Yes
- Number of linked PROFIBUS devices	32
- Data length per connection, max.	240 Byte; Slave-dependent

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-300

CPU 319F-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 318-3FL00-0AB0
Product type description	CPU 319F-3 PN/DP
1st interface	
Physics	RS 485
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	150 mA
MPI	
<ul style="list-style-type: none"> Services <ul style="list-style-type: none"> - S7 communication, as server Transmission speeds, max. 	<p>possible via CP and loadable FB</p> <p>12 MBit/s</p>
DP master	
<ul style="list-style-type: none"> Services <ul style="list-style-type: none"> - S7 basic communication - Isochronous mode Transmission speeds, max. Address area <ul style="list-style-type: none"> - Inputs, max. - Outputs, max. Useful data per DP slave <ul style="list-style-type: none"> - Inputs, max. - Outputs, max. 	<p>with I blocks</p> <p>No</p> <p>12 MBit/s</p> <p>8 KByte</p> <p>8 KByte</p> <p>244 Byte</p> <p>244 Byte</p>
DP slave	
<ul style="list-style-type: none"> Services <ul style="list-style-type: none"> - Routing Transmission speeds, max. Transfer memory <ul style="list-style-type: none"> - Inputs - Outputs Useful data per address area, max. 	<p>with interface active</p> <p>12 MBit/s</p> <p>244 Byte</p> <p>244 Byte</p> <p>32 Byte</p>
2nd interface	
Physics	RS 485
isolated	Yes
Power supply to interface (15 to 30 V DC), max.	200 mA
DP master	
<ul style="list-style-type: none"> Services <ul style="list-style-type: none"> - S7 basic communication - Isochronous mode Transmission speeds, max. Address area <ul style="list-style-type: none"> - Inputs, max. - Outputs, max. Useful data per DP slave <ul style="list-style-type: none"> - Inputs, max. - Outputs, max. 	<p>with I blocks</p> <p>Yes; OB 61</p> <p>12 MBit/s</p> <p>8 KByte</p> <p>8 KByte</p> <p>244 Byte</p> <p>244 Byte</p>

Order No.	6ES7 318-3FL00-0AB0
Product type description	CPU 319F-3 PN/DP
DP slave	
<ul style="list-style-type: none"> Services <ul style="list-style-type: none"> - Routing GSD file Transmission speeds, max. automatic baud rate search Transfer memory <ul style="list-style-type: none"> - Inputs - Outputs Useful data per address area, max. 	<p>with interface active</p> <p>siem807f.gsg</p> <p>12 MBit/s</p> <p>Yes; only with passive interface</p> <p>244 Byte</p> <p>244 Byte</p> <p>32 Byte</p>
3rd interface	
Type of interfaces	PROFINET
Physics	RJ45
isolated	Yes
automatic detection of transmission speed	Yes
Functionality	
<ul style="list-style-type: none"> MPI PROFINET IO controller PROFINET IO device PROFINET CBA Point-to-point coupling 	<p>No</p> <p>Yes</p> <p>No</p> <p>Yes</p> <p>No</p>
Open IE communication	
<ul style="list-style-type: none"> Number of connections, max. 	8
PROFINET CBA (at 50 % communication load)	
<ul style="list-style-type: none"> Acyclic transmission cyclic transmission 	<p>Yes</p> <p>Yes</p>
CPU/programming	
Programming language	
<ul style="list-style-type: none"> STEP 7 	5.4 or higher, Service Pack 1 with HSP
Nesting levels	8
User program protection/ password protection	Yes
Dimensions	
Width	120 mm
Height	125 mm
Depth	130 mm
Weights	
Weight, approx.	1 250 g

2

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 319F-3 PN/DP

2

Ordering data	Order No.		Order No.
CPU 319F-3 PN/DP Main memory 1.4 MB, power supply 24 V DC, combined MPI/PROFIBUS DP master/slave interface, PROFIBUS DP master/slave interface, Ethernet/PROFINET interface; MMC required	6ES7 318-3FL00-0AB0	S7-300 manual Design, CPU data, module data, instruction list <ul style="list-style-type: none"> • German • English • French • Spanish • Italian 	6ES7 398-8FA10-8AA0 6ES7 398-8FA10-8BA0 6ES7 398-8FA10-8CA0 6ES7 398-8FA10-8DA0 6ES7 398-8FA10-8EA0
Distributed Safety V5.4 programming tool <i>Task:</i> Software for configuring fail-safe user programs for SIMATIC S7-300F, S7-400F, ET 200S <i>Requirement:</i> STEP 7 V5.3 SP3 and higher Floating License Software Update Service	6ES7 833-1FC02-0YA5 6ES7 833-1FC00-0YX2	SIMATIC Manual Collection Electronic manuals on DVD, multilingual: S7-200, S7-300, C7, S7-400, SIMATIC DP (distributed I/O), SIMATIC PC, SIMATIC PG (programming devices), STEP 7, Engineering Tools, Runtime Software, SIMATIC PCS 7, SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication), SIMATIC Machine Vision, SIMATIC Sensors	6ES7 998-8XC01-8YE0
Distributed Safety Upgrade From V5.x to V5.4; floating license for 1 user	6ES7 833-1FC02-0YE5	SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	6ES7 998-8XC01-8YE2
Micro Memory Card <ul style="list-style-type: none"> • 64 KB • 128 KB • 512 KB • 2 MB • 4 MB • 8 MB 	6ES7 953-8LF20-0AA0 6ES7 953-8LG11-0AA0 6ES7 953-8LJ20-0AA0 6ES7 953-8LL20-0AA0 6ES7 953-8LM20-0AA0 6ES7 953-8LP20-0AA0	Power supply connector 10 units, spare part	6ES7 391-1AA00-0AA0
MPI cable For connecting SIMATIC S7 and the PG through MPI; 5 m in length	6ES7 901-0BF00-0AA0	Manual "Communication for SIMATIC S7-300/-400" <ul style="list-style-type: none"> • German • English • French • Spanish • Italian 	6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0
Slot number plates	6ES7 912-0AA00-0AA0		

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-300

CPU 319F-3 PN/DP

Ordering data (continued)	Order No.		Order No.
PROFIBUS bus components		PROFINET bus components	
PROFIBUS DP bus connector RS 485		IE FC TP Standard Cable GP 2x2	6XV1 840-2AH10
<ul style="list-style-type: none">• With 90° cable outlet, max. transmission rate 12 Mbit/s<ul style="list-style-type: none">- Without PG interface- With PG interface• With 90° cable outlet for FastConnect connection system, max. transmission rate 12 Mbit/s<ul style="list-style-type: none">- Without PG interface- With PG interface• With axial cable outlet for SIMATIC OP, for connecting to PPI, MPI, PROFIBUS	6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0	4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	
	6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0 6GK1 500-0EA02	FO Standard Cable GP (50/125)	6XV1 873-2A
		Standard cable, splittable, UL approval, sold by the meter	
PROFIBUS Fast Connect bus cable	6XV1 830-0EH10	Industrial Ethernet Switch SCALANCE X208	6GK5 208-0BA10-2AA3
Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m		with eight 10/100 Mbit/s RJ45 ports	
RS 485 repeater for PROFIBUS	6ES7 972-0AA01-0XA0	Compact Switch Module CSM 377	6GK7 377-1AA00-0AA0
Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing		Unmanaged switch for the connection of a SIMATIC S7-300, ET 200M and as many as three other nodes to an Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module incl. electronic equipment manual on CD-ROM	
		IE FC RJ45 plugs	
		RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
		IE FC RJ45 Plug 180	
		180° cable outlet	
		<ul style="list-style-type: none">• 1 unit• 10 units• 50 units	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 414-3 PN/DP

Overview



- CPUs for high demands in the mid-level performance range
- Applicable for plants with additional demands on programming scope and processing speed
- Integrated PROFINET functions in CPU 414-3 PN/DP

Technical specifications

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
Product status	
Hardware product status	1
Firmware version	V5.0
associated programming package	STEP7 V5.4 SP1 or higher
Voltages and currents	
Feeding of external buffer voltage to CPU	5 to 15 VDC
Current consumption	
from backplane bus DC 5 V, max.	1.4 A
from interface DC 5 V, max.	90 mA; At each DP interface
Power loss, typ.	5.5 W
Backup battery	
• Buffer current, typ.	125 µA; Valid up to 40°C
• Buffer current, max.	550 µA
Memory	
Type of storage	
• RAM	
- integrated (for program)	1.4 MByte
- integrated (for data)	1.4 MByte
- expandable	No
• Load memory	
- expandable FEPRM	Yes
- expandable FEPRM, max.	64 MByte
- integrated RAM, max.	512 KByte
- expandable RAM	Yes
- expandable RAM, max.	64 MByte
Backup	
• present	Yes
• with battery	Yes; All data
• without battery	No

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
CPU/blocks	
DB	
• Number, max.	6,000; Number range: 1 to 16,000
• Size, max.	64 KByte
FB	
• Number, max.	3,000; Number range: 0 to 7999
• Size, max.	64 KByte
FC	
• Number, max.	3,000; Number range: 0 to 7,999
• Size, max.	64 KByte
OB	
• Size, max.	64 KByte
Nesting depth	
• per priority class	24
• additional within an error OB	1
CPU/processing times	
for bit operations, min.	45 ns
for word operations, min.	45 ns
for fixed point arithmetic, min.	45 ns
for floating point arithmetic, min.	135 ns
Times/counters and their remanence	
S7 counter	
• Number	2,048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2,047
• Counting range	
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-400

CPU 414-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
S7 times	
• Number	2,048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2,047
- preset	No times retentive
• Time range	
- lower limit	10 ms
- upper limit	9,990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
remanent data area, total	Total working and load memory (with backup battery)
Flag	
• Number, max.	8 KByte
• Remanence available	Yes
• Number of clock memories	8; (in 1 memory byte)
Address area	
I/O address area	
• Inputs	8 KByte
• Outputs	8 KByte
• of which, distributed	
- MPI/DP interface, inputs	2 KByte
- MPI/DP interface, outputs	2 KByte
- DP interface, inputs	6 KByte
- DP interface, outputs	6 KByte
- PN interface, inputs	8 KByte
- PN interface, outputs	8 KByte
Process image	
• Inputs, adjustable	8 KByte
• Outputs, adjustable	8 KByte
• Inputs, preset	256 Byte
• Outputs, preset	256 Byte
• consistent data, max.	244 Byte
• Access to consistent data in process image	Yes
Subprocess images	
• Number of subprocess images, max.	15
Digital channels	
• Inputs	65,536
• Outputs	65,536
• Inputs, of which central	65,536
• Outputs, of which central	65,536
Analog channels	
• Inputs	4,096
• Outputs	4,096
• Inputs, of which central	4,096
• Outputs, of which central	4,096

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
Hardware config.	
connectable OPs	31
Central devices, max.	1
Expansion devices, max.	21
Multicomputing	Yes; Max. 4 CPUs (with UR1 or UR2)
IM	
• Number of connectable IMs (total), max.	6
• Number of connectable IM 460s, max.	6
• Number of connectable IM 463s, max.	4; IM 463-2
Number of DP masters	
• integrated	1
• via IM 467	4
• via CP	10; CP 443-5 Extended
• Mixed mode IM + CP permitted	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode
• via interface module	1; IF 964-DP
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6
Number of IO controllers	
• integrated	1
• via CP	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)	
• FM	Limited due to number of slots and number of connections
• CP, point-to-point	Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Resolution	1 ms
Operating hours counter	
• Number	8
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• to DP, Master	Yes
• to DP, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes
• on Ethernet via NTP	Yes; as client
• to IF 964 DP	Yes

2

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-400

CPU 414-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
S7 message functions	
Number of login stations for message functions, max.	31; Max. 31 with alarm_S and alarm_D (OP's); max. 8 with alarm_8 and alarm_P (e.g. WinCC)
Symbol-related messages	Yes
Number of messages	
• overall, max.	512
Block related messages	Yes
Alarm 8-blocks	Yes
Instrumentation & control messages	Yes
Test commissioning functions	
Status/control	
• Status/control variable	Yes
Forcing	
• Forcing	Yes
Status block	Yes
Single step	Yes
Number of breakpoints	4
Diagnostic buffer	
• present	Yes
• Number of entries, max.	3,200
• adjustable	Yes
• preset	120
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	54 Byte
S7 basic communication	
• supported	Yes
• Useful data per job, max.	76 Byte
S7 communication	
• supported	Yes
• Useful data per job, max.	64 KByte
S5-compatible communication	
• supported	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)
• Useful data per job, max.	8 KByte
Standard communication (FMS)	
• supported	Yes; Via CP and loadable FB
• Web server	Yes
Open IE communication	
• TCP/IP	Yes
- Number of connections, max.	32
- Data length, max.	32 KByte
• ISO-on-TCP (RFC1006)	Yes
- Number of connections, max.	32
- Data length, max.	32 KByte; 1452 bytes via CP 443-1 Adv.
• UDP	Yes
- Number of connections, max.	32
- Data length, max.	1,472 Byte

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
Number of connections	
• overall	32
PROFINET CBA (at set setpoint communication load)	
• Number of remote interconnection partners	32
• Number of functions, master/slave	150
• Total of all master/slave connections	4,500
• Data length of all incoming connections master/slave, max.	45,000 Byte
• Data length of all outgoing connections master/slave, max.	45,000 Byte
• Number of device-internal and PROFIBUS interconnections	1,000
• Data length of device-internal and PROFIBUS interconnections, max.	16,000 Byte
• Data length per connection, max.	2,000 Byte
• Remote interconnections with acyclic transmission	
- Sampling frequency: sampling interval, min.	200 ms; Depending on preset communication load, number of interconnections and data length used
- Number of incoming interconnections	250
- Number of outgoing interconnections	250
- Data length of all incoming interconnections, max.	8,000 Byte
- Data length of all outgoing interconnections, max.	8,000 Byte
- Data length per connection, max.	2,000 Byte
• Remote interconnections with cyclic transmission	
- Transmission frequency: transmission interval, min.	1 ms; Depending on preset communication load, number of interconnections and data length used
- Number of incoming interconnections	300
- Number of outgoing interconnections	300
- Data length of all incoming interconnections, max.	4,800 Byte
- Data length of all outgoing interconnections, max.	4,800 Byte
- Data length per connection, max.	250 Byte
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	2x PN OPC/1x iMap
- HMI variable updating	500 ms
- Number of HMI variables	1,000
- Data length of all HMI variables, max.	32,000 Byte
• PROFIBUS proxy functionality	
- supported	Yes; 32 PROFIBUS slaves max. connectable
- Data length per connection, max.	240 Byte; Slave-dependent

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 414-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
1st interface	
Physics	RS 485 / PROFIBUS + MPI
isolated	Yes
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
MPI	
• Number of connections	32; if a diagnostic repeater is used on the line, the number of connection resources on the line is reduced by 1
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	Yes
- S7 basic communication	Yes
- S7 communication	Yes
• Transmission speeds, max.	12 MBit/s
DP master	
• Number of connections, max.	16
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	No
- S7 basic communication	Yes
- S7 communication	Yes
- equidistance support	Yes
- Activation/deactivation of DP slaves	Yes
- direct data exchange (cross traffic)	Yes
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	32
• Address area	
- Inputs, max.	2 KByte
- Outputs, max.	2 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
DP slave	
• Number of connections	16
• Services	
- Routing	Yes
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Address area, max.	32; Virtual slots
• Useful data per address area, max.	32 Byte
• Useful data per address area, of which consistent, max.	32 Byte

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
2nd interface	
Physics	Ethernet
isolated	Yes
Functionality	
• DP master	No
• DP slave	No
• PROFINET IO controller	Yes
• PROFINET CBA	Yes
• Point-to-point coupling	No
DP master	
• Number of connections, max.	
• Services	
- PG/OP communication	
- Routing	
- S7 basic communication	
- S7 communication	
- equidistance support	
- Activation/deactivation of DP slaves	
- direct data exchange (cross traffic)	
• Transmission speeds, max.	
• Number of DP slaves, max.	
• Address area	
- Inputs, max.	
- Outputs, max.	
• Useful data per DP slave	
- Inputs, max.	
- Outputs, max.	
DP slave	
• Number of connections	
• Services	
- Routing	
- Programming	
• GSD file	
• Transmission speeds, max.	
• Transfer memory	
- Inputs	
- Outputs	
• Address area, max.	
• Useful data per address area, max.	
• Useful data per address area, of which consistent, max.	
PROFINET CBA	
• Acyclic transmission	Yes
• cyclic transmission	Yes

2

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 414-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
PROFINET IO controller	
<ul style="list-style-type: none"> Services <ul style="list-style-type: none"> - PG/OP communication - Routing - S7 communication - open IE communication Transmission rate, min. Transmission speed, max. Number of connectable IO-devices, max. Updating time Address area <ul style="list-style-type: none"> - Inputs, max. - Outputs, max. Useful data consistency, max. 	Yes Yes; Routing of PG functions Yes Yes 10 MBit/s 100 MBit/s 256 250 µs to 512 ms; minimum value dependent on preset communication share for PROFINET I/O, of number of I/O devices and number of config- ured user data 8 KByte 8 KByte 255 Byte; incl. net data accompaniers
3rd interface	
Type of interfaces	Pluggable interface module (IF)
pluggable interface module	IF 964-DP (MLFB: 6ES7 964-2AA04-0AB0)
Physics	RS 485 / PROFIBUS
isolated	Yes
power supply to interface (15 to 30 V DC), max.	150 mA; max. 150 mA
Number of connection resources	16
Functionality	
<ul style="list-style-type: none"> MPI DP master DP slave 	No Yes Yes
DP master	
<ul style="list-style-type: none"> Number of connections, max. Services <ul style="list-style-type: none"> - PG/OP communication - Routing - Global data communication - S7 basic communication - S7 communication - Equidistance support - SYNC/FREEZE - Activation/deactivation of DP slaves - Direct data exchange Transmission rate, max. Number of DP slaves, max. Address area <ul style="list-style-type: none"> - Inputs, max. - Outputs, max. Useful data per DP slave <ul style="list-style-type: none"> - Useful data per DP slave, max. - Inputs, max. - Outputs, max. - Slots, max. - per slot, max. 	16 Yes Yes No Yes Yes Yes Yes Yes 12 MBit/s 96 6 KByte 6 KByte 244 Byte 244 Byte 244 Byte 244 128 Byte

Order No.	6ES7 414-3EM05-0AB0
Product type description	CPU 414-3 PN/DP
DP slave	
<ul style="list-style-type: none"> Number of connections Services <ul style="list-style-type: none"> - Routing - Status/control GSD file Transmission rate, max. Transfer memory <ul style="list-style-type: none"> - Inputs - Outputs Address range, max. Useful data per address area, max. Useful data per address area, of which consistent, max. 	16 Yes Yes http://support.automation.siemens.com/WW/view/de/113652 12 MBit/s 244 Byte 244 Byte 32 32 Byte 32 Byte
Isochronous mode	
Useful data per isochronous slave, max.	244 Byte
equidistance	Yes
shortest clock pulse	1 ms; Without use of SFC 126 and 127 up to 0.5 ms
CiR configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O slave	80 µs
CPU/programming	
Configuration software	
<ul style="list-style-type: none"> STEP 7 	Yes
Programming language	
<ul style="list-style-type: none"> STEP 7 LAD FUP AWL SCL CFC GRAPH HiGraph® 	Yes Yes Yes Yes Yes Yes Yes Yes
Nesting levels	7
User program protection/password protection	Yes
Dimensions	
Width	50 mm
Height	290 mm
Depth	219 mm
Dimensions	
Required slots	2
Weights	
Weight, approx.	900 g

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 414-3 PN/DP

2

Ordering data	Order No.		Order No.
CPU 414-3 PN/DP Main memory 2.8 MB, power supply 24 V DC, MPI/PROFIBUS DP master inter- face, PROFINET interface, slot for memory card, module slot for 1 IF module, incl. slot number labels	6ES7 414-3EM05-0AB0	Manual "Communication for SIMATIC S7-300/400" • German • English • French • Spanish • Italian	6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0
Memory card RAM • 64 KB • 256 KB • 1 MB • 2 MB • 4 MB • 8 MB • 16 MB • 64 MB	6ES7 952-0AF00-0AA0 6ES7 952-1AH00-0AA0 6ES7 952-1AK00-0AA0 6ES7 952-1AL00-0AA0 6ES7 952-1AM00-0AA0 6ES7 952-1AP00-0AA0 6ES7 952-1AS00-0AA0 6ES7 952-1AY00-0AA0	SIMATIC Manual Collection Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET	6ES7 998-8XC01-8YE0
FEPROM memory card • 64 KB • 256 KB • 1 MB • 2 MB • 4 MB • 8 MB • 16 MB • 32 MB • 64 MB	6ES7 952-0KF00-0AA0 6ES7 952-0KH00-0AA0 6ES7 952-1KK00-0AA0 6ES7 952-1KL00-0AA0 6ES7 952-1KM00-0AA0 6ES7 952-1KP00-0AA0 6ES7 952-1KS00-0AA0 6ES7 952-1KT00-0AA0 6ES7 952-1KY00-0AA0	SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	6ES7 998-8XC01-8YE2
MPI cable For connecting SIMATIC S7 and the PG through MPI; 5 m in length	6ES7 901-0BF00-0AA0	Brochure "SIMATIC S7-400 automation system - Design and application" • German • English	6ES7 498-8AA00-8AB0 6ES7 498-8AA00-8BB0
IF 964-DP interface module For connecting an additional PROFIBUS subnet; for CPU 414-3, CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4	6ES7 964-2AA04-0AB0	<i>PROFIBUS bus components</i>	
Slot number plates 1 set (spare part)	6ES7 912-0AA00-0AA0	RS 485 bus connector with 90° cable outlet Max. transfer rate 12 Mbit/s • Without PG interface • With PG interface	6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0
Manual "SIMATIC S7-400 automation system" incl. instruction list • German • English • French • Spanish • Italian	6ES7 498-8AA05-8AA0 6ES7 498-8AA05-8BA0 6ES7 498-8AA05-8CA0 6ES7 498-8AA05-8DA0 6ES7 498-8AA05-8EA0	RS 485 bus connector with angled cable outlet Max. transfer rate 12 Mbit/s • Without PG interface • With PG interface	6ES7 972-0BA41-0XA0 6ES7 972-0BB41-0XA0
S7-400 instructions list • German • English • French • Spanish • Italian	6ES7 498-8AA05-8AN0 6ES7 498-8AA05-8BN0 6ES7 498-8AA05-8CN0 6ES7 498-8AA05-8DN0 6ES7 498-8AA05-8EN0	RS 485 bus connector with 90° cable outlet for FastConnect system Max. transfer rate 12 Mbit/s • Without PG interface • With PG interface	6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0
		RS 485 bus connector with axial cable outlet For SIMATIC OP, for connection to PPI, MPI, PROFIBUS	6GK1 500-0EA02
		PROFIBUS FastConnect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m	6XV1 830-0EH10
		RS 485 repeater for PROFIBUS Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing	6ES7 972-0AA01-0XA0

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 414-3 PN/DP

2

Ordering data (continued)

Order No.

PROFINET bus components

IE FC TP Standard Cable GP 2x2

4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter

6XV1 840-2AH10

FO Standard Cable GP (50/125)

Standard cable, splittable, UL approval, sold by the meter

6XV1 873-2A

SCALANCE X204-2 Industrial Ethernet Switch

Industrial Ethernet Switches with integral SNMP access, web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports

6GK5 204-2BB10-2AA3

IE FC RJ45 plugs

RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables

IE FC RJ45 Plug 180

180° cable outlet

- 1 unit
- 10 units
- 50 units

Order No.

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 416-3 PN/DP

Overview



- High-performance CPUs in the high-end performance range
- Applicable for plants with high requirements in the high-end performance range
- Integrated PROFINET functions in CPU 416-3 PN/DP

2

Technical specifications

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
Product status	
Firmware version	V5.0
associated programming package	STEP 7 V5.4 SP1 or higher
Voltages and currents	
Feeding of external buffer voltage to CPU	5 to 15 VDC
Current consumption	
from backplane bus DC 5 V, max.	1.4 A
from interface DC 5 V, max.	90 mA; At each DP interface
Power loss, typ.	5.5 W
Backup battery	
• Buffer current, typ.	125 µA; Valid up to 40°C
• Buffer current, max.	550 µA
Memory	
Type of storage	
• RAM	
- integrated (for program)	5.6 MByte
- integrated (for data)	5.6 MByte
- expandable	No
• Load memory	
- expandable FEPR0M	Yes; with Memory Card (FLASH)
- expandable FEPR0M, max.	64 MByte
- integrated RAM, max.	1 MByte
- expandable RAM	Yes; With Memory Card (RAM)
- expandable RAM, max.	64 MByte
Backup	
• present	Yes
• with battery	Yes
• without battery	No
CPU/blocks	
DB	
• Number, max.	10,000; Number range: 1 to 16,000
• Size, max.	64 KByte

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
FB	
• Number, max.	5,000; Number range: 0 to 7999
• Size, max.	64 KByte
FC	
• Number, max.	5,000; Number range: 0 to 7,999
• Size, max.	64 KByte
OB	
• Size, max.	64 KByte
Nesting depth	
• per priority class	24
• additional within an error OB	2
CPU/processing times	
for bit operations, min.	30 ns
for word operations, min.	30 ns
for fixed point arithmetic, min.	30 ns
for floating point arithmetic, min.	90 ns
Times/counters and their remanence	
S7 counter	
• Number	2,048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2,047
• Counting range	
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB

PROFINET/Industrial Ethernet

CPU 416-3 PN/DP

CPU 416-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
S7 times	
• Number	2,048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2,047
- preset	No times retentive
• Time range	
- lower limit	10 ms
- upper limit	9,990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
remanent data area, total	Total working and load memory (with backup battery)
Flag	
• Number, max.	16 KByte; Size of bit memory address area
• Remanence available	Yes
• Number of clock memories	8; (in 1 memory byte)
Address area	
I/O address area	
• Inputs	16 KByte
• Outputs	16 KByte
• of which, distributed	
- MPI/DPinterface, inputs	2 KByte
- MPI/DP interface, outputs	2 KByte
- DP interface, inputs	8 KByte
- DP interface, outputs	8 KByte
- PN interface, inputs	8 KByte
- PN interface, outputs	8 KByte
Process image	
• Inputs, adjustable	16 KByte
• Outputs, adjustable	16 KByte
• Inputs, preset	512 Byte
• Outputs, preset	512 Byte
• consistent data, max.	244 Byte
• Access to consistent data in process image	Yes
Subprocess images	
• Number of subprocess images, max.	15
Digital channels	
• Inputs	131,072
• Outputs	131,072
• Inputs, of which central	131,072
• Outputs, of which central	131,072
Analog channels	
• Inputs	8,192
• Outputs	8,192
• Inputs, of which central	8,192
• Outputs, of which central	8,192

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
Hardware config.	
connectable OPs	63
Central devices, max.	1
Expansion devices, max.	21
Multicomputing	Yes; Max. 4 CPUs (with UR1 or UR2)
IM	
• Number of connectable IMs (total), max.	6
• Number of connectable IM 460s, max.	6
• Number of connectable IM 463s, max.	4; IM 463-2
Number of DP masters	
• integrated	1
• via IM 467	4
• via CP	10; CP 443-5 Extended
• Mixed mode IM + CP permitted	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode
• via interface module	1; IF 964-DP
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6
Number of IO controllers	
• integrated	1
• via CP	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)	
• FM	Limited due to number of slots and number of connections
• CP, point-to-point	Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Resolution	1 ms
Operating hours counter	
• Number	8
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• to DP, Master	Yes
• to DP, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes
• on Ethernet via NTP	Yes; as client
• to IF 964 DP	Yes

Technical specifications (continued)

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
S7 message functions	
Number of login stations for message functions, max.	63; Max. 63 with alarm_S and alarm_D (OP's); max. 12 with alarm_8 and alarm_P (e.g. WinCC)
Symbol-related messages	Yes
Number of messages	
• overall, max.	1,024
Block related messages	Yes
Alarm 8-blocks	Yes
Instrumentation & control messages	Yes
Test commissioning functions	
Status/control	
• Status/control variable	Yes
Forcing	
• Forcing	Yes
Status block	Yes
Single step	Yes
Number of breakpoints	4
Diagnostic buffer	
• present	Yes
• Number of entries, max.	3,200
• adjustable	Yes
• preset	120
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	54 Byte
S7 basic communication	
• supported	Yes
• Useful data per job, max.	76 Byte
S7 communication	
• supported	Yes
• Useful data per job, max.	64 KByte
S5-compatible communication	
• supported	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)
• Useful data per job, max.	8 KByte
Standard communication (FMS)	
• supported	Yes; Via CP and loadable FB
• Web server	Yes; Read-only function
Open IE communication	
• TCP/IP	Yes
- Number of connections, max.	64
- Data length, max.	32 KByte
• ISO-on-TCP (RFC1006)	Yes
- Number of connections, max.	64
- Data length, max.	32 KByte; 1452 bytes via CP 443-1 Adv.
• UDP	Yes
- Number of connections, max.	64
- Data length, max.	1,472 Byte

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
Number of connections	
• overall	64
PROFINET CBA (at set setpoint communication load)	
• Number of remote interconnection partners	32
• Number of functions, master/slave	150
• Total of all master/slave connections	6,000
• Data length of all incoming connections master/slave, max.	65,000 Byte
• Data length of all outgoing connections master/slave, max.	65,000 Byte
• Number of device-internal and PROFIBUS interconnections	1,000
• Data length of device-internal and PROFIBUS interconnections, max.	16,000 Byte
• Data length per connection, max.	2,000 Byte
• Remote interconnections with acyclic transmission	
- Sampling frequency: sampling interval, min.	200 ms; Depending on preset communication load, number of interconnections and data length used
- Number of incoming interconnections	500
- Number of outgoing interconnections	500
- Data length of all incoming interconnections, max.	16,000 Byte
- Data length of all outgoing interconnections, max.	16,000 Byte
- Data length per connection, max.	2,000 Byte
• Remote interconnections with cyclic transmission	
- Transmission frequency: transmission interval, min.	1 ms; Depending on preset communication load, number of interconnections and data length used
- Number of incoming interconnections	300
- Number of outgoing interconnections	300
- Data length of all incoming interconnections, max.	4,800 Byte
- Data length of all outgoing interconnections, max.	4,800 Byte
- Data length per connection, max.	250 Byte
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	2x PN OPC/1x iMap
- HMI variable updating	500 ms
- Number of HMI variables	1,500
- Data length of all HMI variables, max.	48,000 Byte
• PROFIBUS proxy functionality	
- supported	Yes; 32 PROFIBUS slaves max. connectable
- Data length per connection, max.	240 Byte; Slave-dependent

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-400

CPU 416-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
1st interface	
Physics	RS 485 / PROFIBUS + MPI
isolated	Yes
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
MPI	
• Number of connections	44
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	Yes
- S7 basic communication	Yes
- S7 communication	Yes
• Transmission speeds, max.	12 MBit/s
DP master	
• Number of connections, max.	32; if a diagnostic repeater is used on the line, the number of connection resources on the line is reduced by 1
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	No
- S7 basic communication	Yes
- S7 communication	Yes
- equidistance support	Yes
- Activation/deactivation of DP slaves	Yes
- direct data exchange (cross traffic)	Yes
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	32
• Address area	
- Inputs, max.	2 KByte
- Outputs, max.	2 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
DP slave	
• Number of connections	32
• Services	
- Routing	Yes; with interface active
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Address area, max.	32; Virtual slots
• Useful data per address area, max.	32 Byte
• Useful data per address area, of which consistent, max.	32 Byte

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
2nd interface	
Physics	Ethernet
isolated	Yes
Functionality	
• DP master	No
• DP slave	No
• PROFINET IO controller	Yes
• PROFINET CBA	Yes
• Point-to-point coupling	No
DP master	
• Number of connections, max.	
• Services	
- PG/OP communication	
- Routing	
- S7 basic communication	
- S7 communication	
- equidistance support	
- Activation/deactivation of DP slaves	
- direct data exchange (cross traffic)	
• Transmission speeds, max.	
• Number of DP slaves, max.	
• Address area	
- Inputs, max.	
- Outputs, max.	
• Useful data per DP slave	
- Inputs, max.	
- Outputs, max.	
DP slave	
• Number of connections	
• Services	
- Routing	
- Programming	
• GSD file	
• Transmission speeds, max.	
• Transfer memory	
- Inputs	
- Outputs	
• Address area, max.	
• Useful data per address area, max.	
• Useful data per address area, of which consistent, max.	
PROFINET CBA	
• Acyclic transmission	Yes
• cyclic transmission	Yes

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-400

CPU 416-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
PROFINET IO controller	
• Services	
- PG/OP communication	Yes
- Routing	Yes; Routing of PG functions
- S7 communication	Yes
- open IE communication	Yes
• Transmission rate, min.	10 MBit/s
• Transmission speed, max.	100 MBit/s
• Number of connectable IO-devices, max.	256
• Updating time	250 µs to 512 ms; minimum value dependent on preset communication share for PROFINET I/O, of number of I/O devices and number of config- ured user data
• Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte
• Useful data consistency, max.	255 Byte; incl. net data companions
3rd interface	
Type of interfaces	Pluggable interface module (IF), technical specifications as for 2nd interface
pluggable interface module	IF 964-DP (MLFB: 6ES7 964-2AA04-0AB0)
Physics	RS 485 / PROFIBUS
isolated	Yes
power supply to interface (15 to 30 V DC), max.	150 mA
Number of connection resources	32
Functionality	
• MPI	No
• DP master	Yes
• DP slave	Yes
DP master	
• Number of connections, max.	32
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	No
- S7 basic communication	Yes
- S7 communication	Yes
- Equidistance support	Yes
- SYNC/FREEZE	Yes
- Activation/deactivation of DP slaves	Yes
- Direct data exchange	Yes
• Transmission rate, max.	12 MBit/s
• Number of DP slaves, max.	125
• Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte

Order No.	6ES7 416-3ER05-0AB0
Product type description	CPU 416-3 PN/DP
• Useful data per DP slave	
- Useful data per DP slave, max.	244 Byte
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
- Slots, max.	244
- per slot, max.	128 Byte
DP slave	
• Number of connections	32
• Services	
- Routing	Yes; When interface active
- Status/control	Yes; When interface active
• GSD file	http://support.automation.siemens.com/WW/view/de/113652
• Transmission rate, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Address range, max.	32
• Useful data per address area, max.	32 Byte
• Useful data per address area, o which consistent, max.	32 Byte
Isochronous mode	
Useful data per isochronous slave, max.	244 Byte
equidistance	Yes
shortest clock pulse	1 ms; Without use of SFC 126 and 127 up to 0.5 ms
CiR configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O slave	40 µs
CPU/programming	
Configuration software	
• STEP 7	Yes
Programming language	
• STEP 7	Yes
• LAD	Yes
• FUP	Yes
• AWL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Nesting levels	7
User program protection/ password protection	Yes
Dimensions	
Width	50 mm
Height	290 mm
Depth	219 mm
Dimensions	
Required slots	2
Weights	
Weight, approx.	900 g

2

PROFINET/Industrial Ethernet

CPU 416-3 PN/DP

CPU 416-3 PN/DP

2

Ordering data	Order No.	Order No.
CPU 416-3 PN/DP Main memory 11.2 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFINET interface, module slot for 1 IF submodule, slot for memory card, incl. slot number labels	6ES7 416-3ER05-0AB0	
Memory card RAM <ul style="list-style-type: none"> • 64 KB • 256 KB • 1 MB • 2 MB • 4 MB • 8 MB • 16 MB • 64 MB 	6ES7 952-0AF00-0AA0 6ES7 952-1AH00-0AA0 6ES7 952-1AK00-0AA0 6ES7 952-1AL00-0AA0 6ES7 952-1AM00-0AA0 6ES7 952-1AP00-0AA0 6ES7 952-1AS00-0AA0 6ES7 952-1AY00-0AA0	Manual "Communication for SIMATIC S7-300/-400" <ul style="list-style-type: none"> • German • English • French • Spanish • Italian
FEPROM memory card <ul style="list-style-type: none"> • 64 KB • 256 KB • 1 MB • 2 MB • 4 MB • 8 MB • 16 MB • 32 MB • 64 MB 	6ES7 952-0KF00-0AA0 6ES7 952-0KH00-0AA0 6ES7 952-1KK00-0AA0 6ES7 952-1KL00-0AA0 6ES7 952-1KM00-0AA0 6ES7 952-1KP00-0AA0 6ES7 952-1KS00-0AA0 6ES7 952-1KT00-0AA0 6ES7 952-1KY00-0AA0	SIMATIC Manual Collection Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET
MPI cable For connecting SIMATIC S7 and the PG through MPI; 5 m in length	6ES7 901-0BF00-0AA0	SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates
IF 964-DP interface module For connecting an additional PROFIBUS subnet; for CPU 414-3, CPU 414-3 PN/DP, CPU 416-3, CPU 416-3 PN/DP, CPU 417-4	6ES7 964-2AA04-0AB0	Brochure "SIMATIC S7-400 automation system - Design and application" <ul style="list-style-type: none"> • German • English
Slot number plates 1 set (spare part)	6ES7 912-0AA00-0AA0	PROFIBUS bus components RS 485 bus connector with 90° cable outlet Max. transfer rate 12 Mbit/s <ul style="list-style-type: none"> • Without PG interface • With PG interface
Manual "SIMATIC S7-400 automation system" incl. instruction list <ul style="list-style-type: none"> • German • English • French • Spanish • Italian 	6ES7 498-8AA05-8AA0 6ES7 498-8AA05-8BA0 6ES7 498-8AA05-8CA0 6ES7 498-8AA05-8DA0 6ES7 498-8AA05-8EA0	RS 485 bus connector with angled cable outlet Max. transfer rate 12 Mbit/s <ul style="list-style-type: none"> • Without PG interface • With PG interface
S7-400 instructions list <ul style="list-style-type: none"> • German • English • French • Spanish • Italian 	6ES7 498-8AA05-8AN0 6ES7 498-8AA05-8BN0 6ES7 498-8AA05-8CN0 6ES7 498-8AA05-8DN0 6ES7 498-8AA05-8EN0	RS 485 bus connector with 90° cable outlet for FastConnect system Max. transfer rate 12 Mbit/s <ul style="list-style-type: none"> • Without PG interface • With PG interface
		RS 485 bus connector with axial cable outlet For SIMATIC OP, for connection to PPI, MPI, PROFIBUS
		PROFIBUS FastConnect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m
		RS 485 repeater for PROFIBUS Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing
		6ES7 398-8EA00-8AA0 6ES7 398-8EA00-8BA0 6ES7 398-8EA00-8CA0 6ES7 398-8EA00-8DA0 6ES7 398-8EA00-8EA0 6ES7 998-8XC01-8YE0 6ES7 998-8XC01-8YE2 6ES7 498-8AA00-8AB0 6ES7 498-8AA00-8BB0 6ES7 972-0BA12-0XA0 6ES7 972-0BB12-0XA0 6ES7 972-0BA41-0XA0 6ES7 972-0BB41-0XA0 6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0 6GK1 500-0EA02 6XV1 830-0EH10 6ES7 972-0AA01-0XA0

PROFINET/Industrial Ethernet
CPUs for SIMATIC S7-400

CPU 416-3 PN/DP

Ordering data (continued)	Order No.		Order No.
PROFINET bus components		IE FC RJ45 plugs	
IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10	RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A	IE FC RJ45 Plug 180 180° cable outlet	
SCALANCE X204-2 Industrial Ethernet Switch Industrial Ethernet Switches with integral SNMP access, web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports	6GK5 204-2BB10-2AA3	<ul style="list-style-type: none">• 1 unit• 10 units• 50 units	

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

SIPLUS CPU 416-3 PN/DP

Overview



High-performance CPUs in the high-end performance range

- Applicable for plants with high requirements in the high-end performance range
- Integrated PROFINET functions in CPU 416-3 PN/DP

Order No.	6AG1 416-3ER05-4AB0
Order No. based on	6ES7 416-3ER05-4AB0
Product type description	SIPLUS CPU 416-3 PN/DP
Environmental conditions	Suited for exceptional medial load (e. g. by chlorine sulfur atmosphere).
Technical specifications	The technical specifications are identical with those of the based-on modules.

Additional information can be found in the Internet under:
<http://www.siemens.com/siplus-techdocu>

Ordering data

Order No.

SIPLUS CPU 416-3 PN/DP

6AG1 416-3ER05-4AB0

Main memory 11.2 MB,
 power supply 24 V DC,
 MPI/PROFIBUS DP master interface, PROFINET interface,
 PROFIBUS DP master interface,
 module slot for 1 IF submodule,
 slot for memory card,
 incl. slot number labels

Accessories

see CPU 416-3 PN/DP
 ordering data

More information

Additional information can be found in the Internet under:
<http://www.siemens.com/siplus-techdocu>

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 416F-3 PN/DP

Overview



- For constructing a fail-safe automation system for plants with increased safety requirements
- High-performance CPU in the top-end performance range
- Satisfies safety requirements up to SIL 3 acc. to IEC 61508 and Cat. 4 acc. to EN 954-1
- Standard and safety-related tasks can be performed with a single CPU
- Multi-processor mode is possible
- Safety-related communication with distributed I/O devices over PROFIBUS DP with the *PROFIsafe* profile
- Fail-safe I/O modules can be connected decentralized over the integrated interfaces (DP and PN with CPU416F-3 PN/DP) and/or through communication modules (CP443-5 Ext. and CP443-1 Adv.)
- Standard modules for non-safety-related applications can be operated centrally and decentralized

2

Technical specifications

Order No.	6ES7 416-3FR05-0AB0
Product type description	CPU 416F-3 PN/DP
Product status	
Firmware version	V5.0
associated programming package	STEP7 V5.3 SP2 or higher with HW-update
Voltages and currents	
Feeding of external buffer voltage to CPU	5 to 15 V DC
Current consumption	
from backplane bus DC 5 V, max.	1.3 A
from interface DC 5 V, max.	90 mA; At each DP interface
Power loss, typ.	4.5 W
Backup battery	
• Buffer current, typ.	125 µA; Valid up to 40°C
• Buffer current, max.	550 µA
Memory	
Type of storage	
• RAM	
- integrated (for program)	5.6 MByte
- integrated (for data)	5.6 MByte
- expandable	No
• Load memory	
- expandable FEPRM	Yes
- expandable FEPRM, max.	64 MByte
- integrated RAM, max.	1 MByte
- expandable RAM	Yes
- expandable RAM, max.	64 MByte
Backup	
• present	Yes
• with battery	Yes
• without battery	No

Order No.	6ES7 416-3FR05-0AB0
Product type description	CPU 416F-3 PN/DP
CPU/blocks	
DB	
• Number, max.	10,000; Number range: 1 to 16,000
• Size, max.	64 KByte
FB	
• Number, max.	5,000; Number range: 0 to 7999
• Size, max.	64 KByte
FC	
• Number, max.	5,000; Number range: 0 to 7,999
• Size, max.	64 KByte
OB	
• Size, max.	64 KByte
Nesting depth	
• per priority class	24
• additional within an error OB	2
CPU/processing times	
for bit operations, min.	30 ns
for word operations, min.	30 ns
for fixed point arithmetic, min.	30 ns
for floating point arithmetic, min.	90 ns
Times/counters and their remanence	
S7 counter	
• Number	2,048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2,047
• Counting range	
- lower limit	0
- upper limit	999

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 416F-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 416-3FR05-0AB0
Product type description	CPU 416F-3 PN/DP
IEC counter	
• present	Yes
• Type	SFB
S7 times	
• Number	2,048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2,047
- preset	No times retentive
• Time range	
- lower limit	10 ms
- upper limit	9,990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
remanent data area, total	Total working and load memory (with backup battery)
Flag	
• Number, max.	16 KByte
• Remanence available	Yes
• Number of clock memories	8; (in 1 memory byte)
Address area	
I/O address area	
• Inputs	16 KByte
• Outputs	16 KByte
• of which, distributed	
- MPI/DP interface, inputs	2 KByte
- MPI/DP interface, outputs	2 KByte
- DP interface, inputs	8 KByte
- DP interface, outputs	8 KByte
Process image	
• Inputs, adjustable	16 KByte
• Outputs, adjustable	16 KByte
• Inputs, preset	512 Byte
• Outputs, preset	512 Byte
• consistent data, max.	244 Byte
• Access to consistent data in process image	Yes
Subprocess images	
• Number of subprocess images, max.	15
Digital channels	
• Inputs	131,072
• Outputs	131,072
• Inputs, of which central	131,072
• Outputs, of which central	131,072
Analog channels	
• Inputs	8,192
• Outputs	8,192
• Inputs, of which central	8,192
• Outputs, of which central	8,192

Order No.	6ES7 416-3FR05-0AB0
Product type description	CPU 416F-3 PN/DP
Hardware config.	
connectable OPs	63
Central devices, max.	1
Expansion devices, max.	21
Multicomputing	Yes; Max. 4 CPUs (with UR1 or UR2)
IM	
• Number of connectable IMs (total), max.	6
• Number of connectable IM 460s, max.	6
• Number of connectable IM 463s, max.	4; IM 463-2
Number of DP masters	
• integrated	2
• via IM 467	4
• via CP	10; CP 443-5 Extended
• Mixed mode IM + CP permitted	No; IM 467 cannot be used with CP 443-5 Ext.; IM 467 cannot be used with CP 443-1 EX40 in PN IO mode
• via interface module	1
• Number of pluggable S5 modules (via adapter capsule in central device), max.	6
Number of IO controllers	
• via CP	4; Via CP 443-1 EX 41 in PN mode; max. 4 in central controller
Number of operable FMs and CPs (recommended)	
• FM	Limited due to number of slots and number of connections
• CP, point-to-point	Limited due to number of slots and number of connections
• PROFIBUS and Ethernet CPs	14; Of which 10 CP or IM max. as DP master and PN controller
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
• Resolution	1 ms
Operating hours counter	
• Number	8
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• to DP, Master	Yes
• to DP, Slave	Yes
• in AS, Master	Yes
• in AS, Slave	Yes
• on Ethernet via NTP	Via CP
• to IF 964 DP	Yes

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 416F-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 416-3FR05-0AB0
Product type description	CPU 416F-3 PN/DP
S7 message functions	
Number of login stations for message functions, max.	63; Max. 63 with ALARM_S and ALARM_D (OPs); max. 12 with ALARM_8 and ALARM_P (e.g. WinCC)
Symbol-related messages	Yes
Number of messages	
• overall, max.	1,024
Block related messages	Yes
Alarm 8-blocks	Yes
Instrumentation & control messages	Yes
Test commissioning functions	
Status/control	
• Status/control variable	Yes
Forcing	
• Forcing	Yes
Status block	Yes
Single step	Yes
Number of breakpoints	4
Diagnostic buffer	
• present	Yes
• Number of entries, max.	3,200
• adjustable	Yes
• preset	120
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	54 Byte
S7 basic communication	
• supported	Yes
• Useful data per job, max.	76 Byte
S7 communication	
• supported	Yes
• Useful data per job, max.	64 KByte
S5-compatible communication	
• supported	Yes; (via CP max. 10 and FC AG_SEND and FC AG_RECV)
• Useful data per job, max.	8 KByte
Standard communication (FMS)	
• supported	Yes; Via CP and loadable FB
• Web server	No; Via CP
• ISO-on-TCP (RFC1006)	Via CP 443-1 Adv. and loadable FB
- Data length, max.	1452
Number of connections	
• overall	64

Order No.	6ES7 416-3FR05-0AB0
Product type description	CPU 416F-3 PN/DP
1st interface	
Physics	RS 485 / PROFIBUS
isolated	Yes
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
MPI	
• Number of connections	44
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	Yes
- S7 basic communication	Yes
- S7 communication	Yes
• Transmission speeds, max.	12 MBit/s
DP master	
• Number of connections, max.	32
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	No
- S7 basic communication	Yes
- S7 communication	Yes
- equidistance support	Yes
- Activation/deactivation of DP slaves	Yes
- direct data exchange (cross traffic)	Yes
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	32
• Address area	
- Inputs, max.	2 KByte
- Outputs, max.	2 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
DP slave	
• Number of connections	32
• Services	
- Routing	Yes
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Address area, max.	32
• Useful data per address area, max.	32 Byte
• Useful data per address area, of which consistent, max.	32 Byte

2

PROFINET/Industrial Ethernet

CPU for SIMATIC S7-400

CPU 416F-3 PN/DP

Technical specifications (continued)

Order No.	6ES7 416-3FR05-0AB0
Product type description	CPU 416F-3 PN/DP
2nd interface	
Physics	RS 485 / PROFIBUS
isolated	Yes
Functionality	
• DP master	Yes
• DP slave	Yes
DP master	
• Number of connections, max.	32
• Services	
- PG/OP communication	Yes
- Routing	Yes
- S7 basic communication	Yes
- S7 communication	Yes
- equidistance support	Yes
- Activation/deactivation of DP slaves	Yes
- direct data exchange (cross traffic)	Yes
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	125
• Address area	
- Inputs, max.	8 KByte
- Outputs, max.	8 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
DP slave	
• Number of connections	32
• Services	
- Routing	Yes
- Programming	Yes
• GSD file	http://support.automation.siemens.com/WW/view/de/113652
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Address area, max.	32
• Useful data per address area, max.	32 Byte
• Useful data per address area, of which consistent, max.	32 Byte

Order No.	6ES7 416-3FR05-0AB0
Product type description	CPU 416F-3 PN/DP
3rd interface	
Type of interfaces	Pluggable interface module (IF), technical specifications as for 2nd interface
pluggable interface module	IF 964-DP (MLFB: 6ES7 964-2AA04-0AB0)
Isochronous mode	
Useful data per isochronous slave, max.	244 Byte
equidistance	Yes
shortest clock pulse	1 ms; 0.5 ms without use of SFC 126, 127
CiR configuration in RUN	
CiR synchronization time, basic load	100 ms
CiR synchronization time, time per I/O slave	40 µs
CPU/programming	
Configuration software	
• STEP 7	Yes
Programming language	
• LAD	Yes
• FUP	Yes
• AWL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Nesting levels	7
User program protection/ password protection	Yes
Dimensions	
Width	50 mm
Height	290 mm
Depth	219 mm
Dimensions	
Required slots	2
Weights	
Weight, approx.	880 g

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 416F-3 PN/DP

2

Ordering data	Order No.	Order No.
CPU 416F-3 PN/DP For configuring safety-related automation systems; main memory 11.2 MB, 24 V DC power supply, MPI/PROFIBUS DP master interface, PROFINET interface, PROFIBUS DP master interface, receptacle for 1 IF submodule, slot for memory card, incl. slot number labels	6ES7 416-3FR05-0AB0	Manual "Communication for SIMATIC S7-300/-400" <ul style="list-style-type: none"> German English French Spanish Italian
Option package S7 F Distributed Safety V5.4 for generating fail-safe programs for the S7-300F <ul style="list-style-type: none"> Floating License Upgrade from V5.x to V5.4 Software Update Service 	6ES7 833-1FC02-0YA5 6ES7 833-1FC02-0YE5 6ES7 833-1FC00-0YX2	SIMATIC Manual Collection Electronic manuals on DVD, five languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, engineering software, runtime software, PCS 7, SIMATIC HMI, SIMATIC NET SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates
Memory card RAM <ul style="list-style-type: none"> 64 KB 256 KB 1 MB 2 MB 4 MB 8 MB 16 MB 64 MB 	6ES7 952-0AF00-0AA0 6ES7 952-1AH00-0AA0 6ES7 952-1AK00-0AA0 6ES7 952-1AL00-0AA0 6ES7 952-1AM00-0AA0 6ES7 952-1AP00-0AA0 6ES7 952-1AS00-0AA0 6ES7 952-1AY00-0AA0	Brochure "SIMATIC S7-400 automation system - Design and application" <ul style="list-style-type: none"> German English
FEPROM memory card <ul style="list-style-type: none"> 64 KB 256 KB 1 MB 2 MB 4 MB 8 MB 16 MB 32 MB 64 MB 	6ES7952-0KF00-0AA0 6ES7952-0KH00-0AA0 6ES7 952-1KK00-0AA0 6ES7 952-1KL00-0AA0 6ES7 952-1KM00-0AA0 6ES7 952-1KP00-0AA0 6ES7 952-1KS00-0AA0 6ES7 952-1KT00-0AA0 6ES7 952-1KY00-0AA0	PROFIBUS bus components RS 485 bus connector with 90° cable outlet Max. transfer rate 12 Mbit/s <ul style="list-style-type: none"> Without PG interface With PG interface
MPI cable For connecting SIMATIC S7 and the PG through MPI; 5 m in length	6ES7 901-0BF00-0AA0	RS 485 bus connector with angled cable outlet Max. transfer rate 12 Mbit/s <ul style="list-style-type: none"> Without PG interface With PG interface
IF 964-DP interface module For connecting an additional DP line	6ES7 964-2AA04-0AB0	RS 485 bus connector with 90° cable outlet for FastConnect system Max. transfer rate 12 Mbit/s <ul style="list-style-type: none"> Without PG interface With PG interface
Slot number plates 1 set (spare part)	6ES7 912-0AA00-0AA0	RS 485 bus connector with axial cable outlet For SIMATIC OP, for connection to PPI, MPI, PROFIBUS
Manual "SIMATIC S7-400 automation system" incl. instruction list <ul style="list-style-type: none"> German English French Spanish Italian 	6ES7 498-8AA05-8AA0 6ES7 498-8AA05-8BA0 6ES7 498-8AA05-8CA0 6ES7 498-8AA05-8DA0 6ES7 498-8AA05-8EA0	PROFIBUS FastConnect bus cable Standard type with special design for quick mounting, 2-core, shielded, sold by the meter, max. delivery unit 1000 m, minimum order quantity 20 m
S7-400 instructions list <ul style="list-style-type: none"> German English French Spanish Italian 	6ES7 498-8AA05-8AN0 6ES7 498-8AA05-8BN0 6ES7 498-8AA05-8CN0 6ES7 498-8AA05-8DN0 6ES7 498-8AA05-8EN0	RS 485 repeater for PROFIBUS Data transfer rate up to 12 Mbit/s; 24 V DC; IP20 housing

PROFINET/Industrial Ethernet

CPUs for SIMATIC S7-400

CPU 416F-3 PN/DP

2

Ordering data (continued)

Order No.

PROFINET bus components

IE FC TP Standard Cable GP 2x2

4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter

6XV1 840-2AH10

FO Standard Cable GP (50/125)

Standard cable, splittable, UL approval, sold by the meter

6XV1 873-2A

SCALANCE X204-2 Industrial Ethernet Switch

Industrial Ethernet Switches with integral SNMP access, web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports

6GK5 204-2BB10-2AA3

IE FC RJ45 plugs

RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables

IE FC RJ45 Plug 180

180° cable outlet

- 1 unit
- 10 units
- 50 units

Order No.

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

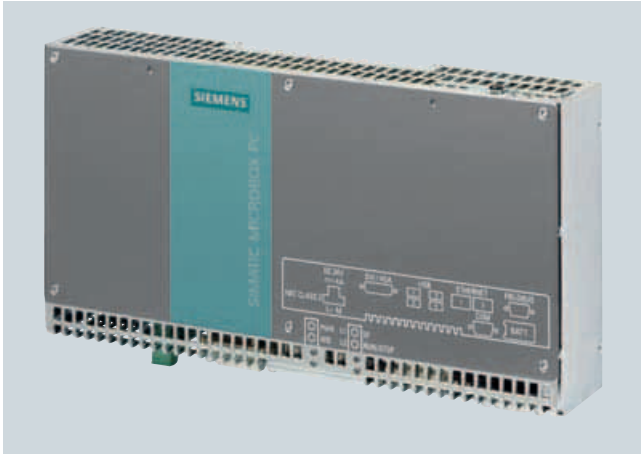
6GK1 901-1BB10-2AE0

PROFINET/Industrial Ethernet

SIMATIC PC-based Control/Embedded Automation

SIMATIC Microbox 427B-RTX

Overview



- Quick start in automation solutions with embedded PC platforms:
 - SIMATIC WinAC RTX ready-to-run preinstalled on Microbox PC 427B
 - PROFIBUS and Industrial Ethernet ready configured for use in SIMATIC environment
 - Optionally WinCC flexible for visualization tasks
 - Configuration and programming with SIMATIC STEP 7 via Industrial Ethernet or PROFIBUS
- Rugged operation:
 - Operation without hard disk based on Compact-Flash-Card (CF-Card) and Windows XP embedded
 - Fanless operation
- Flexibility of a PC-based automation environment:
 - Freer storage space on CF-Card useable for further PC applications
 - Use of WinAC ODK with SIMATIC WinAC RTX
 - Connection option for USB devices, flat panel monitor or screen
 - PCI 104 cards pluggable
- 128 KB remanent data for WinAC RTX even without uninterruptible power supply (UPS)

New compared to SIMATIC Microbox 420-RTX:

- Considerably improved performance of the system
- Versions with WinCC flexible Runtime available
- 128 KB remanent data
- Display of operating state of SIMATIC WinAC RTX via user LED of SIMATIC Microbox PC 427B
- 2 and 4 GB CF cards as mass storage

Application

The SIMATIC Microbox 427B-RTX combines the advantages of PC-based control solutions with those of the established PLC world: It offers on one hardware the flexibility for integration of various tasks of an automation solution. The fanless design with no hard disk of the Microbox PC allows the use of the solution directly at the machine in harsh environment. With the Ethernet and PROFIBUS interfaces the system can, with a minimum effort, be integrated in already existing automation environments (SIMATIC range, Siemens drive systems).

The Microbox RTX is the preferred platform, if the following criteria for automation solutions must be fulfilled:

- Ultra-compact, unattended operation("headless operation")
- Operation with remote screen
- Integration of various tasks like controlling, visualizing, technology functions or data processing in one hardware
- Application of user-specific hardware and software
- Usage in machines

Function

- Control:
 - Several processing levels for optimum control of processes with WinAC RTX are available:
 - Cyclic program execution.
 - Alarm processing.
 - Time and date controlled processing.
- Retentivity:
 - Without an UPS, the control can save up to 128 KB of remanent data on an integrated, zero-voltage proof memory. Full retentivity of all process values of SIMATIC WinAC RTX can be achieved with a customary UPS
- Access to all process values:
 - The SIMATIC NET OPC server, delivered with the Microbox 427B-RTX, allows open access to all process values. Any visualization or data processing systems can be connected to SIMATIC WinAC RTX via this interface.
- Communication:
 - Programming of WinAC RTX with SIMATIC STEP 7 and transfer of the WinCC flexible project take place via the integral Industrial Ethernet interface. For this purpose the communication kit SIMATIC NET SOFTNET-S7 Lean was installed. Alternatively, download of the S7 program to WinAC RTX is also possible via the PROFIBUS DP interface.
- Use of more software:
 - Client-side software products can be installed. Windows XP Embedded is that way designed, that typically additional kits can be installed.

PROFINET/Industrial Ethernet

SIMATIC PC-based Control/Embedded Automation

SIMATIC Microbox 427B-RTX

Technical specifications

Order No.	6ES7 675-1C..0-0..0
Product type description	SIMATIC Microbox 427B-RTX
Plant configuration	
Operating systems	Windows XP embedded SP2
Power supply	
Input voltage	
• Rated value, DC 24 V	Yes
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V
Input current	
• Rated value at DC 24 V	2.5 A
Supply voltages	
Power supply and voltage jumpering	
• Mains/voltage failure jumpering	5 ms
Voltages and currents	
Power consumption	
• Power consumption, max.	61 W
Status information/alarms/diagnostics	
Diagnoses	
• Diagnostic functions	Yes

Order No.	6ES7 675-1C..0-0..0
Product type description	SIMATIC Microbox 427B-RTX
Environmental requirements	
Operating temperature	
• min.	0 °C
• max.	50 °C
Storage/transport temperature	
• min.	-20 °C
• max.	60 °C
Degree and class of protection	
• IP 20	Yes
Standards, approvals, certificates	
CE symbol	Yes
cULus	Yes
Dimensions	
Dimensions	
Width	262 mm
Height	133 mm
Depth	47 mm
Weights	
Weight	2 kg

PROFINET/Industrial Ethernet

SIMATIC PC-based Control/Embedded Automation

SIMATIC Microbox 427B-RTX

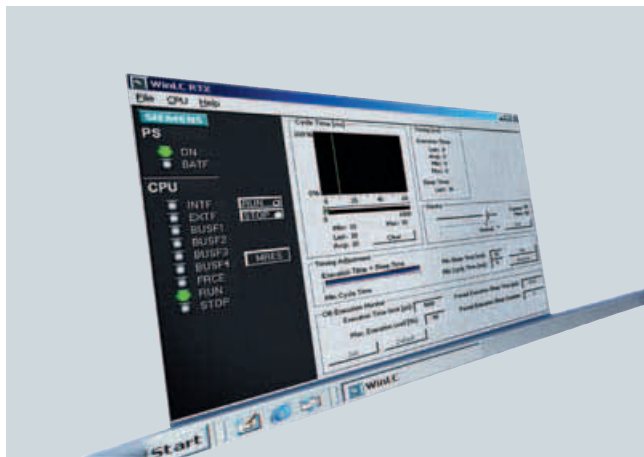
Ordering data	Order No.	Order No.
SIMATIC Microbox 427B-RTX and -HMI/RTX	6ES7 675-1C ■ 0-0 ■ 0	
CPU:		
Celeron M, 900 MHz, PROFIBUS, 512 MB RAM	B 2	
Celeron M, 1 GHz, PROFIBUS, 1 GB RAM	F 3	
Pentium M, 1.4 GHz, PROFIBUS, 1 GB RAM	K 3	
Mass storage:		
2 GB CompactFlash, Windows XP embedded and preinstalled software	C	
4 GB CompactFlash, Windows XP embedded and preinstalled software	D	
Software configuration:		
WinAC RTX 2005	B	
WinAC RTX 2005, WinCC flexible 2007 RT 128 PT	F	
WinAC RTX 2005, WinCC flexible 2007 RT 512 PT	G	
WinAC RTX 2005, WinCC flexible 2007 RT 2048 PT	H	
		PROFINET bus components
		CP 1604 Microbox Package
		Package for implementing the CP 1604 in the SIMATIC Microbox PC; comprising the CP 1604, connection board, power supply and expansion racks for Microbox PC; for use with Development Kit DK-16xx PN IO; NCM PC
		6GK1 160-4AU00
		IE FC TP Standard Cable GP 2x2
		4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter
		6XV1 840-2AH10
		FO Standard Cable GP (50/125)
		Standard cable, splittable, UL approval, sold by the meter
		6XV1 873-2A
		SCALANCE X204-2 Industrial Ethernet Switch
		Industrial Ethernet Switches with integral SNMP access, web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports
		6GK5 204-2BB10-2AA3
		IE FC RJ45 plugs
		RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables
		IE FC RJ45 Plug 180
		180° cable outlet
		• 1 unit
		• 10 units
		• 50 units
		6GK1 901-1BB10-2AA0
		6GK1 901-1BB10-2AB0
		6GK1 901-1BB10-2AE0

PROFINET/Industrial Ethernet

SIMATIC PC-based Control/Embedded Automation

SIMATIC WinAC Software PLC

Overview



- SIMATIC WINAC RTX:
Optimized for applications that demand a high level of flexibility and integration
- The software solution for tasks that demand hard deterministics and high performance
- With real-time expansion for guaranteeing deterministic behavior for the control component

Technical specifications

Order No.	6ES7 671-0RC05-0YA0
Product type description	SIMATIC WinAC Software PLC
Memory	
Type of storage	
• RAM	PC work memory can be used (non-paged memory)
- integrated	
• Load memory	PC work memory can be used (non-paged memory)
- integrated RAM, max.	
CPU/blocks	
DB	
• Number, max.	Limited only by available PC work memory
• Size, max.	64 KByte
FB	
• Number, max.	Limited only by available PC work memory
• Size, max.	64 KByte
FC	
• Number, max.	Limited only by available PC work memory
• Size, max.	64 KByte
OB	
• Size, max.	64 KByte
Nesting depth	
• per priority class	24
• additional within an error OB	24
CPU/processing times	
Reference platform	Pentium IV, 2.4 GHz

Order No.	6ES7 671-0RC05-0YA0
Product type description	SIMATIC WinAC Software PLC
Times/counters and their remanence	
S7 counter	
• Number	2,048
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	2,047
- preset	8
• Counting range	
- adjustable	Yes
- lower limit	0
- upper limit	999
IEC counter	
• present	Yes
• Type	SFB
S7 times	
• Number	2,048
• Remanence	
- lower limit	0
- upper limit	2,047
- preset	0
• Time range	
- lower limit	10 ms
- upper limit	9,990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
Remanence with UPS	all data

PROFINET/Industrial Ethernet

SIMATIC PC-based Control/Embedded Automation

SIMATIC WinAC Software PLC

Technical specifications (continued)

Order No.	6ES7 671-0RC05-0YA0
Product type description	SIMATIC WinAC Software PLC
Flag	
• Number, max.	16 KByte
• of which remanent	MB 0 to MB 16383
• Remanence preset	MB 0 to MB 15
• Number of clock memories	8
Address area	
I/O address area	
• Inputs	16 KByte
• Outputs	16 KByte
• of which, distributed	
- DP interface, inputs	16 KByte
- DP interface, outputs	16 KByte
Process image	
• Inputs, adjustable	8 KByte
• Outputs, adjustable	8 KByte
• Inputs, preset	512 Byte
• Outputs, preset	512 Byte
Subprocess images	
• Number of subprocess images, max.	15
Digital channels	
• Outputs	128,000
Analog channels	
• Inputs	8,000
• Outputs	8,000
Hardware config.	
Submodules	
• Number of submodules, max	4
• of which PROFIBUS, max.	4; CP 5611, CP 5611-A2, integrated PB interface of the SIMATIC PC, CP 5613, CP 5613-A2
Number of operable FMs and CPs (recommended)	
• FM	FM distributed: FM 350-1 / 350-2, FM 351, FM 352, FM 353, FM 355 / 355-2
• CP, point-to-point	CP 340, CP 341 distributed
• CP, LAN	Over PC CP
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes
Clock synchronization	
• supports	Yes
• to PC-CP, Slave	Yes
S7 message functions	
SCAN procedure	No
Process diagnostic messages	Yes; Alarm_S
Alarm 8-blocks	Yes
Instrumentation & control messages	No

Order No.	6ES7 671-0RC05-0YA0
Product type description	SIMATIC WinAC Software PLC
Test commissioning functions	
Status/control	
• Status/control variable	Yes
Forcing	
• Forcing	No
Status block	Yes
Single step	Yes
Diagnostic buffer	
• present	Yes
• Number of entries, max.	3,200
• preset	120
Communication functions	
PG/OP communication	Yes
Global data communication	
• supported	No
S7 basic communication	
• supported	No
S7 communication	
• as server	Yes
• as client	Yes
Number of connections	
• overall	64
• reserved for PG communication	1
• reserved for OP communication	1
1st interface	
Type of interface	CP 5611, CP 5611-A2, integrated PB interface of the SIMATIC PC
Number of simult. operable CPs, max.	1
Physics	RS 485 / PROFIBUS
isolated	Yes
Functionality	
• MPI	No
• DP master	Yes
• DP slave	No
DP master	
• Number of connections, max.	8
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	No
- S7 basic communication	No
- S7 communication	Yes
- equidistance support	Yes
- SYNC/FREEZE	Yes
- Activation/deactivation of DP slaves	Yes
- direct data exchange (cross traffic)	Yes
- DPV0	Yes
- DPV1	Yes

PROFINET/Industrial Ethernet

SIMATIC PC-based Control/Embedded Automation

SIMATIC WinAC Software PLC

Technical specifications (continued)

Order No.	6ES7 671-0RC05-0YA0
Product type description	SIMATIC WinAC Software PLC
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	64
• Address area	
- Inputs, max.	16 KByte
- Outputs, max.	16 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte
2nd interface	
Type of interface	CP 5613, CP 5613-A2
Number of simult. operable CPs, max.	4
Physics	RS 485 / PROFIBUS
isolated	Yes
Functionality	
• MPI	No
• DP master	Yes
• DP slave	No
• PROFINET IO controller	No
• PROFINET CBA	No
• PROFINET CBA-SRT	No
DP master	
• Number of connections, max.	50
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	No
- S7 basic communication	No
- S7 communication	Yes
- equidistance support	Yes
- SYNC/FREEZE	Yes
- Activation/deactivation of DP slaves	Yes
- direct data exchange (cross traffic)	Yes
- DPV0	Yes
- DPV1	Yes
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	125
• Address area	
- Inputs, max.	16 KByte
- Outputs, max.	16 KByte
• Useful data per DP slave	
- Inputs, max.	244 Byte
- Outputs, max.	244 Byte

Order No.	6ES7 671-0RC05-0YA0
Product type description	SIMATIC WinAC Software PLC
Isochronous mode	
Isochronous mode	Yes
Number of DP masters with isochronous mode	2
Useful data per isochronous slave, max.	128 Byte
equidistance	Yes
shortest clock pulse	2.2 ms; 2.2 ms without partial process image; 2.2 ms with partial process image
CPU/programming	
Programming language	
• STEP 7	Yes
• LAD	Yes
• FUP	Yes
• AWL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Software libraries	
• Easy Motion Control	Yes
Nesting levels	8
User program protection/password protection	Yes
Open development interfaces	
• CCX (Custom Code Extension)	Yes; with WinAC ODK V4.1
• SMX (Shared Memory Extension)	Yes; with WinAC ODK V4.1
- Inputs	4 KByte
- Outputs	4 KByte
• CMI (Controller Management Interface)	Yes; with WinAC ODK V4.1
Hardware requirements	
Hardware required	PC with color monitor, keyboard, mouse or pointing device for Windows
Resolution (pixels)	
Required memory on hard disk, min.	100 MByte
Main memory, min.	256 MByte
Processor	Intel Pentium 400 MHz
• Multi-processor system	Yes
• Hyperthreading	Yes
Operating systems	
Operating system	
• Windows NT 4.0	No
• Windows 2000	Yes; Professional, SP3 or higher
• Windows XP	Yes; Professional, SP1 and SP2

PROFINET/Industrial Ethernet

SIMATIC PC-based Control/Embedded Automation

SIMATIC WinAC Software PLC

Ordering data	Order No.		Order No.
SIMATIC WinAC RTX 2005 Software-based PC-based control system for applications requiring a strictly deterministic response; CD-ROM with electronic documentation in English, French and German; Single license, for Windows 2000/XP	6ES7 671-0RC05-0YA0	IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10
SIMATIC WinAC RTX 2005 Upgrade For upgrading from Basic/RTX V3.x, V4.0, V4.1 to 2005; single license, for Windows 2000/XP	6ES7 671-0RC05-0YE0	FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A
SIMATIC WinAC NV128 PC plug-in card with non-volatile memory for the storage of up to 128 Kbyte of retentive data in the event of voltage failure	6ES7 671-0AG00-1YA7	SCALANCE X204-2 Industrial Ethernet Switch Industrial Ethernet Switches with integral SNMP access, web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports	6GK5 204-2BB10-2AA3
CP 5611 A2 communications processor PCI card (32-bit) for connection of a programming device or PC to PROFIBUS	6GK1 561-1AA01	IE FC RJ45 plugs RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0
CP 5613 A2 communications processor PCI card (32-bit; 3.3 V/5 V) for connection to PROFIBUS incl. DP-Base software with NCM PC; DP-RAM interface for DP master, incl. PG and FDL protocol; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, German/English	6GK1 561-3AA01	IE FC RJ45 Plug 180 180° cable outlet <ul style="list-style-type: none"> • 1 unit • 10 units • 50 units 	
SIMATIC WinAC RTX 2005 Software-based PC-based control system for applications requiring a strictly deterministic response; CD-ROM with electronic documentation in English, French and German; Single license, for Windows 2000/XP	6GK1 161-3AA01		

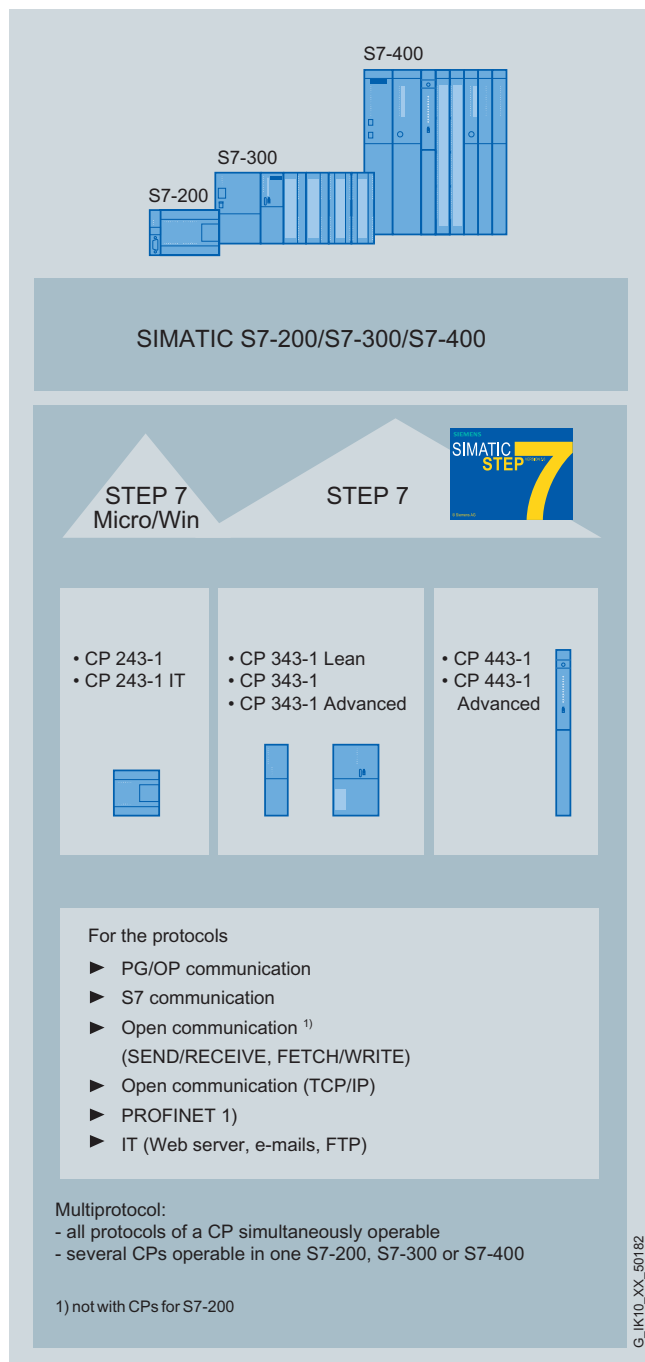
PROFINET/Industrial Ethernet

System interfacing for SIMATIC and SINUMERIK

Introduction

Overview

2



System connections for SIMATIC

CPs with standard functions

- CP 243-1 for SIMATIC S7-200, CP 343-1 Lean and CP 343-1 for SIMATIC S7-300, CP 443-1 for SIMATIC S7-400
- Designed for use in harsh industrial environments
- Shipbuilding certification for use on ships and offshore units
- Additional integrated 2-port switch for setting up small local networks with CP 343-1 Lean, CP 343-1 and CP 443-1
- Can be used via RJ45 interface for the industrial-standard SIMATIC NET FastConnect cabling system
- High-speed data transfer even with large volumes of data (10/100 Mbit/s)

CPs with function expansions

- CP 243-1 IT for SIMATIC S7-200
 - With IT functionality
- CP 343-1 Advanced for SIMATIC S7-300
 - With IT functionality
 - Can be used as a PROFINET IO Controller and IO Device with real-time characteristics
 - PROFINET CBA
 - With Gigabit connection, incl. routing functionality (10/100/1000 Mbit/s)
 - Network separation with IP-routing functionality
 - Additional integrated 2-port switch for setting up small local networks
 - Access protection via IP access list
 - Comprehensive diagnostics capabilities
- CP 443-1 Advanced for SIMATIC S7-400
 - With IT functionality
 - Can be used as a PROFINET IO Controller with real-time characteristics
 - With Gigabit connection, incl. routing functionality (10/100/1000 Mbit/s)
 - Network separation with IP-routing functionality
 - Additional integrated 4-port switch for setting up small local networks
 - Access protection via IP access list
 - Comprehensive diagnostics capabilities
 - Operation in SIMATIC H system for redundant S7 communication
 - Operation in fail-safe applications (PROFIsafe) together with SIMATIC S7-400 CPU 416F

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 243-1

Overview



ISO	TCP	PN	MRP	IT	IP-R	PG/OP	S7
	●					●	●

- Connection of S7-200 to Industrial Ethernet with
 - 10/100 Mbit/s
 - Half/full duplex
 - RJ 45 socket
 - TCP/IP
- Configuration, remote programming and service with STEP 7 Micro/WIN over Industrial Ethernet possible (program upload and program download, status)
- CPU/CPU communication over Industrial Ethernet possible (client + server, 8 S7 connections + 1 PG connection)
- An S7 OPC server (e.g. SOFTNET-S7 or S7-1613) allows PLC data to be further processed in PC applications
- Module replacement possible without PG

Benefits



- Time and cost savings due to fast and easy configuration, programming and monitoring from a central location via LAN
- Fast access via Ethernet for archiving or further processing of SIMATIC S7-200 process data
- Increased data throughput, almost unlimited expansion and use of a standardized Ethernet infrastructure
- SIMATIC S7-300 and S7-400 programmable controllers can communicate with S7-200 over Industrial Ethernet which means that S7-200 can also be used for more complex applications.
- Reduction of complexity and savings for networking all automation levels and devices since only Ethernet is required
- Simple startup and easy diagnostics options due to configuration support by STEP 7 Micro/WIN
- Simple maintenance since modules can be replaced without a PG and network administrator support is simple (e.g. PING)
- Open data exchange with PC applications over OPC is possible

Application

- The CP 243-1 communication processor is used to connect S7-200 to Industrial Ethernet.
- A SIMATIC S7-200 with STEP 7-Micro/WIN can be configured, programmed and diagnosed remotely over Industrial Ethernet in this way.
- An S7-200 programmable controller with CP 243-1 can exchange data with other S7 programmable controllers over Industrial Ethernet.
- PC applications can access the data of an S7-200 via an S7 OPC server. In this way, process data can be easily archived or further processed.

Design

The CP 243-1 offers all the advantages of the SIMATIC S7-200 system design:

- Compact construction in a rugged plastic housing
- Terminal block for connecting the external supply voltage of 24 V DC
- LED status display
- Alternatively, standard rail mounting or wall mounting
- RJ45 socket for connecting to Ethernet (10/100 Mbit/s full/half duplex with automatic transmission rate detection)

Function

The CP 243-1 independently handles data traffic over Industrial Ethernet. The communication is based on TCP/IP. You can configure up to eight connections. For connection control (keep alive) it is possible to configure an adjustable time for all TCP/IP transport connections for active and passive partners.

The CP 243-1 enables communication between an S7-200 and another S7-200 or S7-300/S7-400 controller via Ethernet.

Integration into PC applications is possible by means of the S7-OPC server of the PC software.

The CP 243-1 enables the S7-200 programming software STEP 7-Micro/WIN to access the S7-200 via Industrial Ethernet.

Configuration

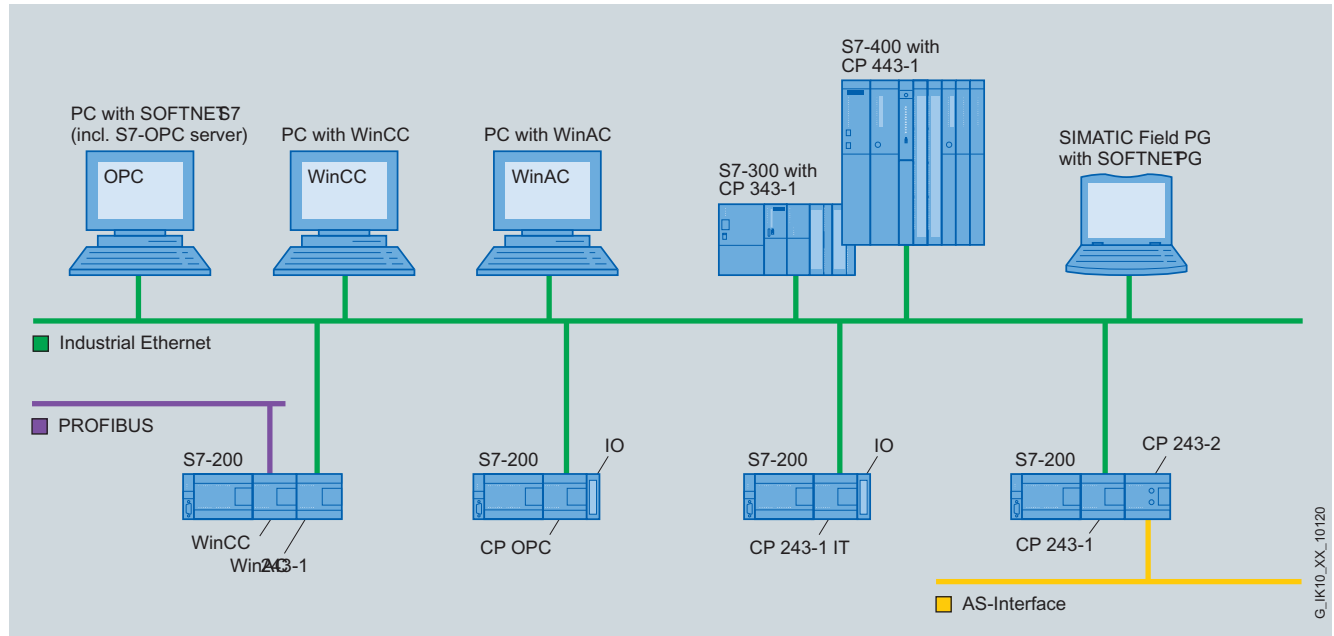
- STEP 7-Micro/WIN V3.2 SP1 is required for configuring the full functional scope of the CP 243-1.
- The programming data of the CP 243-1 are stored on the S7-200 CPU so it is possible to replace modules without a programming device
- The CP 243-1 is supplied with a globally unique MAC address that cannot be changed.

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 243-1

Integration



S7-200 communication options with CP 243-1

Technical specifications

Order No.	6GK7 243-1EX00-0XE0
Product type description	CP 243-1
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Electrical connection version	
• at Industrial Ethernet interface 1	1 x RJ45 (TP)
• for voltage supply	2-pin terminal strip
Supply voltage	
Type of supply voltage	DC
Supply voltage	24 V
• Relative symmetrical tolerance at 24 V DC	5%
Current consumption	
Current consumed	
• from backplane bus at 24 V DC typical	55 mA
• from external supply voltage at 24 V DC typical	60 mA
Effective power loss	1,75 W

Order No.	6GK7 243-1EX00-0XE0
Product type description	CP 243-1
Permitted ambient conditions	
Ambient temperature for vertical installation	
• during operation	0 ... +45 °C
Ambient temperature for horizontal installation	
• during operation	0 ... +55 °C
Ambient temperature during storage	-40 ... +70 °C
Ambient temperature during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	Compact module S7-200, double width
• Width	71,2 mm
• Height	80 mm
• Depth	62 mm
Net weight	150 g
Performance data	
S7 communication	
Number of possible connections for S7 communication	
• Maximum	8
• for PG connections, maximum	1
Configuration	
Configuration software for full scope of functions from STEP 7-Micro/WIN V3.2 SP1	Yes

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 243-1

2

Ordering data	Order No.		Order No.
CP 243-1 communications processor for connection of SIMATIC S7-200 to Industrial Ethernet; for S7 communication, PG communication with electronic manual on CD-ROM, German, English, French, Italian, Spanish	6GK7 243-1EX00-0XE0	S7-1613 Edition 2007 Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English <ul style="list-style-type: none">• Single license for 1 installation• Software Update Service for 1 year, with automatic extension; requirement: Current software version• Upgrade S7-1613 from V6.4 to 2007 Edition• Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 Edition 2007	6GK1 716-1CB70-3AA0 6GK1 716-1CB00-3AL0 6GK1 716-1CB00-3AE0 6GK1 716-1CB00-3AE1
SOFTNET Edition 2007 for Industrial Ethernet Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English			
SOFTNET-S7 Edition 2007 for Industrial Ethernet up to 64 connections <ul style="list-style-type: none">• Single license for 1 installation• Software Update Service for 1 year, with automatic extension; requirement: Current software version• Upgrade from V6.4 to 2007 edition• Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition	6GK1 704-1CW70-3AA0 6GK1 704-1CW00-3AL0 6GK1 704-1CW00-3AE0 6GK1 704-1CW00-3AE1		
SOFTNET-S7 Lean Edition 2007 for Industrial Ethernet up to 8 connections <ul style="list-style-type: none">• Single license for 1 installation• Software Update Service for 1 year, with automatic extension; requirement: Current software version• Upgrade from V6.4 to 2007 Edition• Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition	6GK1 704-1LW70-3AA0 6GK1 704-1LW00-3AL0 6GK1 704-1LW00-3AE0 6GK1 704-1LW00-3AE1	STEP 7-Micro/WIN V4 programming software <i>Target system:</i> All CPUs of the SIMATIC S7-200 <i>Prerequisite:</i> Windows 2000/XP on PG or PC <i>Type of delivery:</i> German, English, French, Spanish, Italian, Chinese; with online documentation <ul style="list-style-type: none">• Single license• Upgrade Single License¹⁾	6ES7 810-2CC03-0YX0 6ES7 810-2CC03-0YX3
		IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10
		FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A
		SCALANCE X204-2 Industrial Ethernet Switch Industrial Ethernet Switches with integral SNMP access, web diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports	6GK5 204-2BB10-2AA3
		IE FC RJ45 plugs RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables	
		IE FC RJ45 Plug 180 180° cable outlet <ul style="list-style-type: none">• 1 unit• 10 units• 50 units	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0

¹⁾ Upgrade for all previous STEP 7-Micro/WIN and STEP 7-Micro/DOS versions

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 243-1 IT

Overview



ISO	TCP	PN	MRP	IT	IP-R	PG/OP	S7
	●			●		●	●

- Connection of S7-200 to Industrial Ethernet with
 - 10/100 Mbit/s
 - Half/full duplex
 - RJ 45 socket
 - TCP/IP
- Configuration, remote programming and service with STEP 7 Micro/WIN over Industrial Ethernet possible (program upload and program download, status)
- CPU/CPU communication over Industrial Ethernet possible (client + server, 8 S7 connections + 1 PG connection)
- IT communication
 - Web function
 - E-mail function
 - FTP client function for program-controlled data communication (e.g. DOS, UNIX, Linux, embedded systems)
- FTP server with 8 MB memory
- An S7 OPC server (e.g. SOFTNET-S7 or S7-1613) allows PLC data to be further processed in PC applications

Benefits



- Process information can be accessed simultaneously (password protected) with standard Web browsers, which reduces software costs on the client side
- Low-cost bulk storage for data, statistics and HTML-based machine or plant documentation
- Simple universal linking of PLCs to different computers by means of FTP
- Local and worldwide transmission of event-driven messages by e-mail
- Time and cost savings due to fast and easy configuration, programming and monitoring from a central location via LAN
- SIMATIC S7-300 and S7-400 programmable controllers can communicate with S7-200 over Industrial Ethernet which means that S7-200 can also be used for more complex applications.
- Reduction of complexity and savings for networking all automation levels and devices since only Ethernet is required
- Simple startup and easy diagnostics options due to configuration support by STEP 7 Micro/WIN
- Open data exchange with PC applications over S7 OPC server is possible

Application

- The CP 243-1 IT communications processor is used to connect S7-200 to Industrial Ethernet.
- A SIMATIC S7-200 with STEP 7-Micro/WIN can be configured, programmed and diagnosed remotely over Industrial Ethernet in this way.
- A S7-200 programmable controller with CP 243-1 IT can exchange data with other S7 programmable controllers over Industrial Ethernet.
- Simple visualization using Web technology, sending e-mails, and file processing (FTP). The file system of the CP 243-1 IT can also be managed through the CPU. The file system serves as a bulk storage device, a cross-system computer link and a storage for HTML pages and Java applets. The CP 243-1 IT has a large file system in which, apart from HTML pages, machine documentation or user guides can also be stored.
- Distributed plants can be reached over telephone lines or the Internet by using a router and simple diagnostics, signal or user functions can be performed with the help of a web browser. The CP 243-1 IT is especially suited for plant sections in which using PCs for permanent monitoring functions would not be cost-effective.
- PC applications can access the data of an S7-200 via an S7 OPC server. In this way, process data can be easily archived or further processed.

Design

The CP 243-1 IT offers all the advantages of the SIMATIC S7-200 system design:

- Compact construction in a rugged plastic housing
- Terminal block for connecting the external supply voltage of 24 V DC
- LED status display
- Alternatively, standard rail mounting or wall mounting
- RJ45 socket for connecting to Ethernet (10/100 Mbit/s full/half duplex with automatic transmission rate detection)

Function

- The CP 243-1 IT independently handles data traffic over Industrial Ethernet.
- The communication is based on TCP/IP.
- You can configure up to eight connections. For connection control (keep alive) it is possible to configure an adjustable time for all TCP/IP transport connections for active and passive partners.
- The CP 243-1 IT enables communication between an S7-200 and another S7-200 or S7-300/S7-400 controller via Industrial Ethernet.
- Integration into PC applications is possible by means of the S7-OPC server of the PC software.
- The CP 243-1 IT enables the S7-200 programming software STEP 7-Micro/WIN to access the S7-200 via Industrial Ethernet.

IT functions

Web server;

HTML pages can be downloaded and viewed with standard browsers

Web pages

- For observation of the S7-200 controller: standard pages for system diagnostics and a simple variable editor are supplied.
- Other customer-specific pages can be generated with any HTML tools

E-mails;

sending of pre-defined e-mails direct from the user program
Variables can be integrated into the text

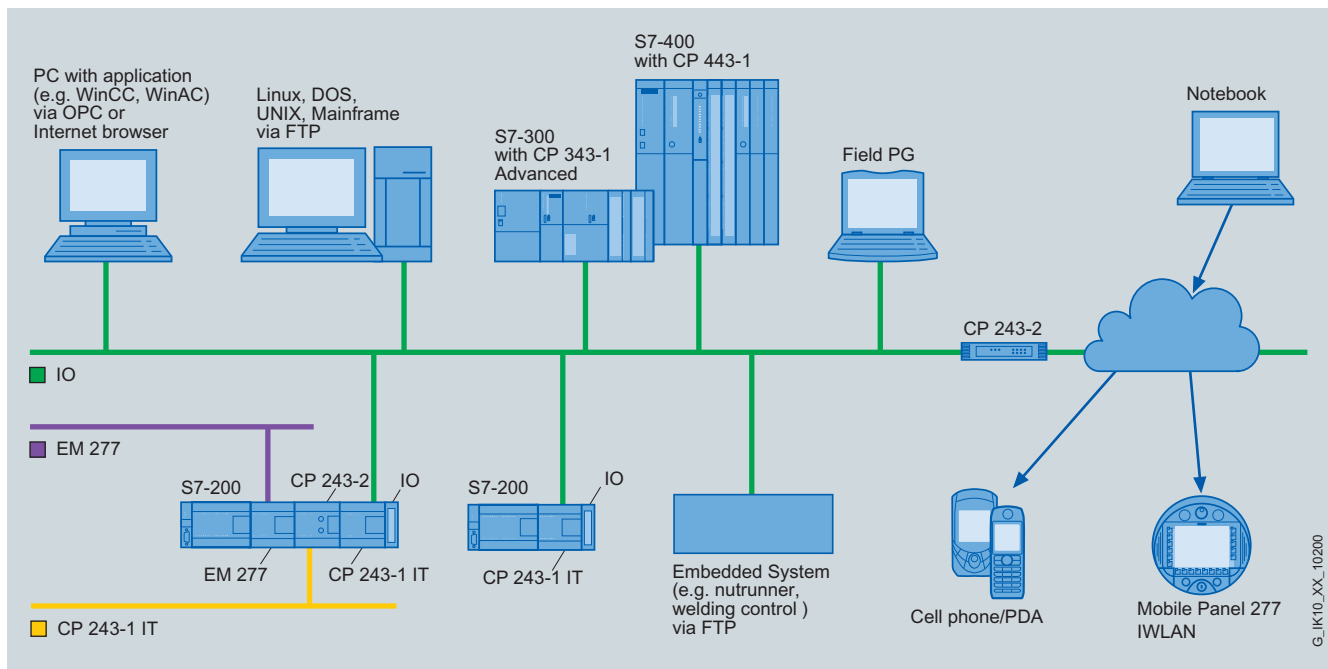
FTP communication

The CPU can send data blocks as files to other computers or can read or delete the files of other computers (client function). Communication through FTP is possible with most operating systems

Configuration

- STEP 7 Micro/WIN V3.2 SP3 or higher is required for configuring the full functional scope of the CP 243-1 IT.
- The CP 243-1 is supplied with a globally unique MAC address that cannot be changed.

Integration



S7-200 communication options with CP 243-1 IT

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 243-1 IT

Technical specifications

Order No.	6GK7 243-1GX00-0XE0
Product type description	CP 243-1IT
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Electrical connection version	
• at Industrial Ethernet interface 1	1 x RJ45 (TP)
• for voltage supply	1 x 2-pin terminal block
Supply voltage	
Type of supply voltage	DC
Supply voltage	24 V
Relative symmetrical tolerance at 24 V DC	5%
Current consumption	
Current consumed	
• from backplane bus at 24 V DC typical	55 mA
• from external supply voltage at 24 V DC typical	60 mA
Effective power loss	1,75 W
Permitted ambient conditions	
Ambient temperature for vertical installation	
• during operation	0 ... +45 °C
Ambient temperature for horizontal installation	
• during operation	0 ... +55 °C
Ambient temperature during storage	-40 ... +70 °C
Ambient temperature during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%

Order No.	6GK7 243-1GX00-0XE0
Product type description	CP 243-1IT
Design, dimensions and weight	
Module format	Compact module S7-200, double width
• Width	71,2 mm
• Height	80 mm
• Depth	62 mm
Net weight	150 g
Performance data	
S7 communication	
Number of possible connections for S7 communication	
• Maximum	8
• for PG connections, maximum	1
IT functions	
Number of possible connections	
• as client by means of FTP, max.	1
• as server by means of HTTP, max.	4
• to an e-mail server as e-mail client, max.	1
Number of e-mails with 1024 characters of the e-mail client, max.	32
Number of access authorizations of the access protection	8
Memory capacity of the user memory as FLASH memory file system	8 MB
Number of possible write cycles of the flash memory cells	1 000 000
Configuration	
Configuration software for full scope of functions from STEP 7-Micro/WIN V3.2 SP3	Yes

1) Upgrade for all previous STEP 7-Micro/WIN and STEP 7-Micro/DOS versions

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Lean

Overview



ISO	TCP/ UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
	●	●				●	●

- Interface for the SIMATIC S7-300 to Industrial Ethernet (not for SINUMERIK)
 - 2 x RJ45 interface for 10/100 Mbit/s full/half duplex connection (with autosensing for automatic switchover and autocrossover function)
 - Integral 2-port real-time switch ERTEC
 - Multi-protocol operation with TCP and UDP transport protocol and PROFINET I/O
 - Keep Alive function
- Communication services:
 - Open communication (TCP/IP and UDP):
 - PG/OP communication
 - S7 communication (server)
 - PROFINET I/O device
- Multicast for UDP
- Remote programming and initial start-up is possible exclusively over Industrial Ethernet
- IT communication
 - Web function
- Integration into network management through SNMP
- Configuration with STEP 7
- Cross-network programming device/operator panel communication through S7 routing
- Diagnostic possibilities in STEP 7 and with web browser

Benefits



- Direct integration of S7-300 in complex systems by means of Industrial Ethernet at 100 Mbit/s
- Ideally suited for use in networks with line topology through integral 2-port real-time switch
- Investment protection for existing plants through the integration of the SIMATIC S7-300 by means of the open communication
- Simple, fast data exchange between SIMATIC S7-300 and other programmable controllers through link as PROFINET I/O Device
 - Openness through use on any PROFINET I/O controllers
 - Configuring using a GSDML file
- Flexible use thanks to lack of slot rules
- One slot is saved thanks to single-width format
- Remote programming is possible due to the WAN characteristic of TCP/IP, even via the telephone network (e.g. ISDN)
- A large number of stations can be accessed thanks to the multicast function
- Access by as many as 4 HMI systems to the SIMATIC S7-300
- Use of the socket interface in the partner system possible without RFC 1006
- Initial start-up can be performed directly over Industrial Ethernet
- Uncrossed connecting cables can be used due to the integrated Autocrossover function
- Secure data communication by means of industry-standard device interface using the plug-in connector IE FC RJ45 Plug 145/180 and additional strain relief by latching the connector to the housing

Application

The CP 343-1 Lean is the communications processor for SIMATIC S7-300 for Industrial Ethernet.

With its own processor, the CP 343-1 Lean relieves the CPU of communications tasks and facilitates additional connections.

The CP 343-1 Lean offers the communication options of the S7-300:

- Programming devices, processors and HMI devices
- Other SIMATIC S7 systems
- SIMATIC S5 PLCs
- PROFINET I/O Controllers

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Lean

Design

The CP 343-1 Lean offers all the advantages of SIMATIC S7-300 system design:

- Compact design; the rugged plastic casing features on the front:
 - two RJ45 sockets for connecting to Industrial Ethernet with automatic detection of data transfer rate by means of autosensing; RJ45 sockets have an industry-compatible design with additional securing collar for connection of IE FC RJ45 Plug 145/180
 - diagnostic LEDs for each switch port
 - 2-pin plug-in terminal block for connecting the external supply voltage of 24 V DC
- Easy installation; The CP 343-1 Lean is snap-mounted on the S7-300 DIN rail and connected to adjacent modules through the bus connectors. There are no slot rules.
- The CP 343-1 Lean can be operated without a fan. A standby battery is not required.
- In combination with IM 360/361, CP 343-1 Lean can also be used in an expansion rack (ER).
- The module can be replaced without the need for a programming device

Function

The CP 343-1 Lean independently handles data traffic over Industrial Ethernet. The module has its own processor. Layers 1 to 4 comply with international standards.

Multi-protocol operation of the transport protocols TCP/IP and UDP as well as PROFINET I/O is possible.

The CP 343-1 Lean has a preset unique Ethernet address and can be put directly into operation through the network.

The CP 343-1 Lean works in multi-protocol mode for the following communication services:

PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing; Using S7 routing it is possible to use programming device communication across networks.

S7 communication

Is used for connecting the S7-300 (server only) to S7-400, HMI devices and PCs (SOFTNET-S7 or CP 1613 A2 /CP 1623 with S7-1613).

Open communication

On the basis of layer 4, the open communication with SEND/RECEIVE offers a simple and optimized interface for data communication. Up to 8 KB of data can be transmitted in one call.

This interface enables

- TCP transport connections with or without RFC 1006
- UDP
 - Multicast for UDP

to be used.

Open IE and S5-compatible communication is used for communication with SIMATIC S5, SIMATIC S7-400/300 and computers/PCs.

The function blocks required are a component part of STEP 7 for Industrial Ethernet and must be integrated into the S7 user program.

Open communication with FETCH/WRITE allows direct access to the CPU data of the SIMATIC S7 (in the same way as in the CP 1430 TCP and the SIMATIC S5). This means existing HMI systems can still be used.

Implementing UDP as the transmission protocol allows utilization of the multicast function to simultaneously send and receive data on configured multicast circuits.

PROFINET I/O device functionality

The CP 343-1 Lean can be operated as a PROFINET I/O device in order to exchange data from the user program of the S7-300 station with a PROFINET I/O controller just like a field device (as input and output data). This high-performance data exchange using PROFINET I/O communication mechanisms is handled independently by the CP 343-1 Lean. For connection to PC-based systems, for example, the CP 1616 or CP 1604 can be used as PROFINET IO-controller.

Diagnostics

Comprehensive diagnostic options are available via STEP 7 or a web browser, including:

- Status of the CP
- General diagnostics and statistics functions
- Connection diagnostics
- LAN controller statistics
- Diagnostic buffer
- Web diagnostics with easy diagnostic functions

Via SNMP all MIB-2 objects can be read out. This enables the current status of the Ethernet interfaces to be retrieved.

Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the CP 343-1 Lean.

The configuration data of the CP is stored on the CPU. This allows the module to be replaced without a programming device.

Integration

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Lean

Technical specifications

Order No.	6GK7 343-1CX10-0XE0
Product type description	CP 343-1 Lean
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Electrical connection version	
• at Industrial Ethernet interface 1	2 x RJ45 socket (TP)
• for voltage supply	2-pin plug-in terminal strip
Supply voltage	
Type of supply voltage	DC
Supply voltage	24 V
• Relative positive tolerance at 24 V DC	20%
• Relative negative tolerance at 24 V DC	15%
Current consumption	
Current consumed	
• from backplane bus at 5 V DC, max.	200 mA
• from external supply voltage at 24 V DC typical	160 mA
• from external supply voltage at 24 V DC max.	200 mA
Effective power loss	
Effective power loss	5,8 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 ... +60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	S7-300 compact module, single width
• Width	40 mm
• Height	125 mm
• Depth	120 mm
Net weight	220 g

Order No.	6GK7 343-1CX10-0XE0
Product type description	CP 343-1 Lean
Performance data	
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. ¹⁾	8
Number of multicast stations	8
Data volume as useful data for open communication by means of SEND/RECEIVE blocks	
• per TCP connection, max.	8 KB
• per UDP connection, max.	2 KB
S7 communication	
Number of possible connections for S7 communication, max.	4
PG/OP communication	
Number of operable OP connections, max.	4
Multi-protocol operation	
Number of active connections in multi-protocol operation	12
Performance data PROFINET communication as PN IO-Device	
Data volume	
• as useful data for input variables as PROFINET IO device, max.	512 bytes
• as useful data for output variables as PROFINET IO device, max.	512 bytes
Data volume	
• as useful data for input variables per sub-module as PROFINET IO device, max.	240 bytes
• as useful data for output variables per sub-module as PROFINET IO device, max.	240 bytes
• as useful data for the consistency area for each sub-module	240 bytes
Number of sub-modules per PROFINET IO device	32
Configuration	
Configuration software for full functional scope in STEP 7 V5.4 or higher	Yes

¹⁾ also S5-compatible communication

2

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Lean

2

Ordering data	Order No.		Order No.
CP 343-1 Lean communications processor For connecting SIMATIC S7-300 to Industrial Ethernet through TCP/IP and UDP, Multicast, S7 communication, open communication (SEND/RECEIVE), FETCH/WRITE, PROFINET IO device, integral 2-port switch ERTEC, comprehensive diagnostics facilities, module replacement without PG, SNMP, initial commissioning over LAN; with electronic manual on CD-ROM	6GK7 343-1CX10-0XE0	SOFTNET-S7 Edition 2007 for Industrial Ethernet up to 64 connections <ul style="list-style-type: none">• Single license for 1 installation• Software Update Service for 1 year, with automatic extension; requirement: Current software version• Upgrade from V6.4 to 2007 edition• Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition	6GK1 704-1CW70-3AA0 6GK1 704-1CW00-3AL0 6GK1 704-1CW00-3AE0 6GK1 704-1CW00-3AE1
IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10	SOFTNET-S7 Lean Edition 2007 for Industrial Ethernet up to 8 connections <ul style="list-style-type: none">• Single License for 1 installation• Software Update Service for 1 year, with automatic extension; requirement: Current software version• Upgrade from V6.4 to 2007 edition• Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition	6GK1 704-1LW70-3AA0 6GK1 704-1LW00-3AL0 6GK1 704-1LW00-3AE0 6GK1 704-1LW00-3AE1
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A		
SCALANCE X204-2 Industrial Ethernet switch Industrial Ethernet switches with integral SNMP access, online diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports	6GK5 204-2BB10-2AA3	S7-1613 Edition 2007 Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, SP2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English <ul style="list-style-type: none">• Single License for 1 installation• Software Update Service for 1 year, with automatic extension; requirement: Current software version• Upgrade S7-1613 from V6.4 to 2007 Edition• Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 Edition 2007	6GK1 716-1CB70-3AA0 6GK1 716-1CB00-3AL0 6GK1 716-1CB00-3AE0 6GK1 716-1CB00-3AE1
Compact Switch Module CSM 377 Unmanaged switch for connection of a SIMATIC S7-300-CPU, ET 200M and as many as three further nodes to Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module including electronic equipment manual on CD-ROM	6GK7 377-1AA00-0AA0		
IE FC RJ45 Plug 180 RJ45 plug connector for Industrial Ethernet with a rugged metal enclosure and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables with 180° cable outlet; • 1 pack = 1 unit • 1 pack = 10 units • 1 pack = 50 units	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0		
SOFTNET Edition 2007 for Industrial Ethernet Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; German/English		STEP 7 Version 5.4 <i>Target system:</i> SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC <i>Requirement:</i> Windows 2000 Prof./XP Prof. <i>Delivery package:</i> German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation <ul style="list-style-type: none">• Floating License on CD• Rental license for 50 hours• Software Update Service on CD (requires current software version)• Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD• Trial License STEP 7 V5.4; on CD, runs for 14 days	6ES7 810-4CC08-0YA5 6ES7 810-4CC08-0YA6 6ES7 810-4BC01-0YX2 6ES7 810-4CC08-0YE5 6ES7 810-4CC08-0YA7

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1

Overview



ISO	TCP/UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●	●				●	●

- Connection of SIMATIC S7-300/SINUMERIK 840D powerline to Industrial Ethernet
 - 2 x RJ45 interface for 10/100 Mbit/s full/half duplex connection with autosensing/autonegotiation and autocrossover function
 - Integral 2-port real-time switch ERTEC
 - Multi-protocol operation with ISO, TCP and UDP transport protocol and PROFINET I/O
 - Adjustable Keep Alive function
- Communication services:
 - Open communication (ISO, TCP/IP and UDP)
 - PROFINET IO Controller or PROFINET IO Device
 - Programming device/operator panel communication: Cross-network by means of S7 routing
 - S7 communication (client, server, multiplexing)
- Multicast for UDP
- IP address assignment via DHCP, simple PC tool or via the user program (e.g. HMI)
- Access protection by means of configurable access list
- Remote programming and initial startup via Industrial Ethernet
- Configuration with STEP 7
- Automatic setting of the CPU clock via Ethernet with NTP or SIMATIC procedure
- IT communication
 - Web function
- Integration in network management systems over SNMP (MIB2 diagnostic information)
- Diagnostic possibilities in STEP 7 and with web browser

Benefits



- Ideally suited for use in networks with a line topology through an integral 2-port real-time switch
- Connection of field devices to Industrial Ethernet with PROFINET
- Quick and easy exchange of data between SIMATIC S7-300 and other programmable controllers by connecting as a PROFINET IO Device
- Investment protection for existing plants through the integration of the SIMATIC S7-300 by means of the open communication
- Security:
 - Protection through device-oriented IP address lists without the need for changing passwords
- Remote programming is possible due to the WAN characteristic of TCP/IP, even via the telephone network (e.g. ISDN)
- Setting of intrinsic IP parameters of series machines without STEP 7
- Plant-wide time synchronization via NTP or SIMATIC procedure
- Accessibility of many nodes by means of free UDP connections or multicast function
- Use of the socket interface in the partner system possible without RFC 1006
- One slot is saved due to the single-width format
- Uncrossed connecting cables can be used due to the integrated Autocrossover function

Application

The CP 343-1 is the communications module for the SIMATIC S7-300 for connection to Industrial Ethernet.

With its integral processor, it takes communications load off the CPU and permits additional connections.

The CP 343-1 permits communication of the S7-300 with:

- Programming devices, computers, HMI devices
- Other SIMATIC S7/C7 systems
- SIMATIC S5 programmable controllers
- SINUMERIK 840D powerline
- Field devices (PROFINET IO Devices)
- Non-Siemens devices

The CP 343-1 can be used in the SINUMERIK 840D powerline to connect it to Industrial Ethernet and to communicate with other automation systems, e.g. by means of open IE communication, S7 communication, or PROFINET communication.

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1

Design

The CP 343-1 has all the advantages of the SIMATIC S7-300 design:

- Compact design;
on the front, the rugged plastic housing features:
 - Two RJ45 sockets for connection to Industrial Ethernet with automatic sensing of the data transmission rate by means of Autosensing/Autonegotiation; the RJ45 sockets are industrially compatible and designed with additional holding collars for connecting to the IE FC RJ45 Plug 145/180
 - 2-pole plug-in terminal strip for connection of the 24 V DC external supply voltage
 - 8 LEDs for indication of the operating and communication status (diagnostics for each switch port)
- Easy installation;
the CP 343-1 is mounted on the S7-300 rail and connected through the bus connector with the neighboring modules. No slot rules apply.
- Fan-free operation;
A back-up battery is not required.
- Using the IM 360/361, the CP 343-1 can also be operated in the expansion rack (ER)
- Modules can be replaced without the need for a programming device

Function

The CP 343-1 independently handles data traffic over Industrial Ethernet. The module has its own processor. Layers 1 to 4 comply with international standards.

Multi-protocol operation of the transport protocols ISO, TCP/IP, UDP and PROFINET IO is possible. For connection control (keep alive) it is possible to configure an adjustable time for all TCP transport connections for active and passive partners.

The CPU's time can be set using NTP or SIMATIC procedures with an accuracy of approx. +/-1 s.

The CP 343-1 has a preset unique Ethernet address and can be put directly into operation over the network.

The CP 343-1 works in multi-protocol mode for the following communication services:

PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing;
with the aid of S7 routing it is possible to use programming device communication across networks

PROFINET communication

- *PROFINET IO Controller*;
for connecting field devices and PC-based IO devices (e.g. with CP 1616 or CP 1604) over Industrial Ethernet, the CP 343-1 supports the functions of a PROFINET IO Controller
- *PROFINET IO Device*;
the CP 343-1 can be operated as a PROFINET IO Device for exchanging data from the user program of the S7-300 station like a field device (as input and output data) with a PROFINET IO Controller.

Access by means of I/O data from the user program of the S7-300 station is through the PNIO_SEND and PNIO_RECV blocks.

S7 communication

For connecting the S7-300 (server and client) to S7-200/300/400 (server and client), HMI units and PCs (SOFTNET-S7 or CP 1613 A2/CP 1623 with S7-1613).

Open communication

Based on layer 4, this is a simple, optimized interface for data communication. Up to 8 KB of data can be transmitted in one call.

The following connection possibilities can be used with this interface:

- TCP transport connections
 - TCP with RFC 1006
 - TCP without RFC 1006
- UDP
 - Multicast for UDP
- ISO transport connections

Open communication is used for communication with SIMATIC S5, SIMATIC S7-400/300 and computers/PCs.

The function blocks required are a component part of STEP 7 for Industrial Ethernet and must be integrated into the S7 user program.

Open communication with FETCH/WRITE allows direct access to the CPU data of the SIMATIC S7 (in the same way as in the CP 1430 TCP and the SIMATIC S5). This means existing HMI systems can still be used.

Implementing UDP as the transmission protocol allows utilization of the multicast function to simultaneously send and receive data on configured multicast circuits.

Diagnostics

Comprehensive diagnostic options are available via STEP 7 or a web browser, including:

- Operating status of CP
- Operating status of PROFINET devices connected to CP
- General diagnostics and statistics functions
- Connection diagnostics
- LAN controller statistics
- Diagnostic buffer
- Web diagnostics with easy diagnostic functions

Diagnostics possibilities during operation.

- Status scanning of connections using function block
- SNMP MIB-2 objects;
the current status of the Ethernet interface can then be called, e.g. for network management.

Security

With a configurable IP access list, specific PCs and automation devices can be released for IP-based access to the CP or controller.

Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the CP 343-1.

The configuration data of the CPs can be saved on the CPU. Modules can be swapped without using a programming device.

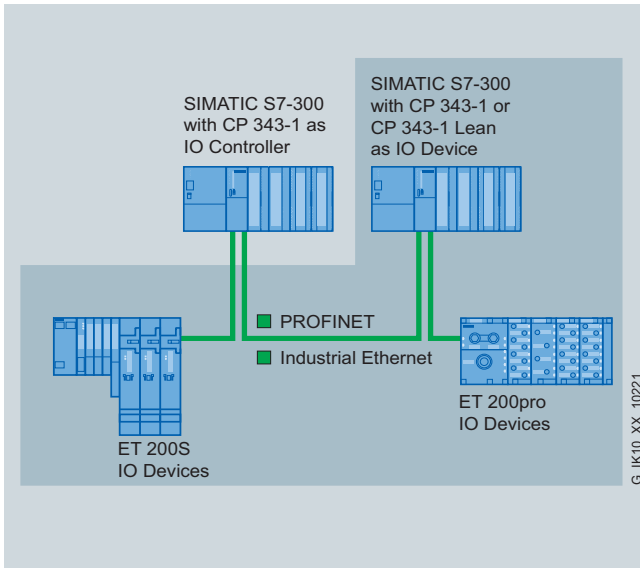
The function blocks required for communication and the programmable communications block (S7-Client) are included in the scope of supply of NCM S7 for Industrial Ethernet or can be downloaded from the Internet.

PROFINET/Industrial Ethernet

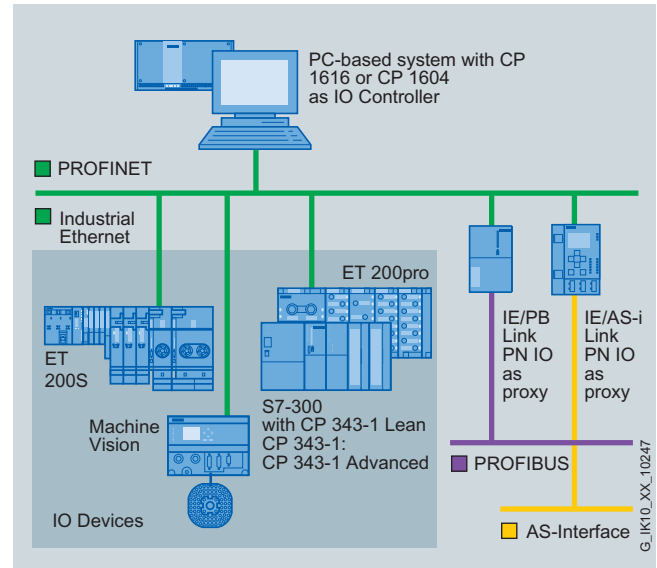
System interfacing for SIMATIC S7

CP 343-1

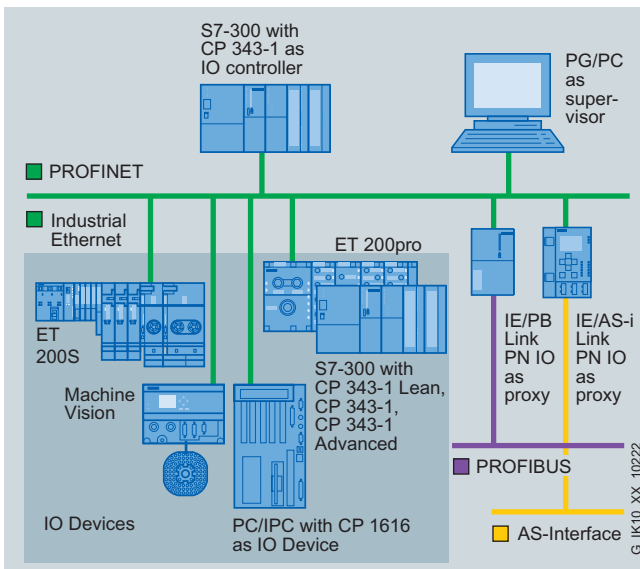
Integration



Line structure with CP 343-1 with integrated real-time switch as a PROFINET IO controller or IO device



Connection to higher-level network and PC-based system



Interfacing to higher-level network with CP 343-1 as PROFINET IO controller

2

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1

Technical specifications

Order No.	6GK7 343-1EX30-0XE0
Product type description	CP 343-1
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Electrical connection version	
• at Industrial Ethernet interface 1	2 x RJ45 (TP)
• for voltage supply	2-pin plug-in terminal strip
Supply voltage	
Type of supply voltage	DC
Supply voltage	24 V
• Relative positive tolerance at 24 V DC	20%
• Relative negative tolerance at 24 V DC	15%
Current consumption	
Current consumed	
• from backplane bus at 5 V DC typical	200 mA
• from external supply voltage at 24 V DC typical	-
• from external supply voltage at 24 V DC max.	200 mA
Effective power loss	
Effective power loss	5,8 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 ... +60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	S7-300 compact module, single width
• Width	40 mm
• Height	125 mm
• Depth	120 mm
Net weight	220 g

Order No.	6GK7 343-1EX30-0XE0
Product type description	CP 343-1
Performance data	
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. ¹⁾	16
Number of multicast stations	16
Data volume as useful data for open comm. by means of SEND/RECEIVE blocks	
• per ISO connection, max.	8 KB
• per ISO on TCP connection, max.	8 KB
• per TCP connection, max.	8 KB
• per UDP connection, max.	2 KB
S7 communication	
Number of possible connections for S7 communication, max.	16
PG/OP communication	
Number of possible connections for S7 communication for OP connections, max.	16
Multi-protocol operation	
Number of active connections in multi-protocol operation	32
Performance data, PROFINET communication as PN IO controller	
Number of PN IO devices operable as PROFINET IO controllers	32
Data volume	
• as useful data for input variables as PROFINET IO controller	1 024 bytes
• as useful data for output variables as PROFINET IO controller	1 024 bytes
• as useful data for input variables per PN IO device as PROFINET IO controller, max.	240 bytes
• as useful data for output variables per PN IO device as PROFINET IO controller, max.	240 bytes
Performance data PROFINET communication as PN IO-Device	
Data volume	
• as useful data for input variables as PROFINET IO device, max.	512 bytes
• as useful data for output variables as PROFINET IO device, max.	512 bytes
• as useful data for input variables per sub-module as PROFINET IO device, max.	240 bytes
• as useful data for output variables per sub-module as PROFINET IO device, max.	240 bytes
• as useful data for the consistency area for each sub-module	240 bytes
Number of sub-modules per PROFINET IO device	32
Configuration	
Configuration software for full functional scope in STEP 7 V5.4 or higher	Yes

¹⁾ also S5-compatible communication

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1

2

Ordering data	Order No.	Order No.
CP 343-1 communications processor For connection of SIMATIC S7-300 to Industrial Ethernet over ISO and TCP/IP; PROFINET IO Controller or PROFINET IO Device, integrated 2-port switch ERTEC; S7 communication, open communication (SEND/RECEIVE), FETCH/WRITE, with and without RFC 1006, multicast, DHCP, CPU clock synchronization via SIMATIC procedure and NTP, diagnostics, SNMP, access protection through IP access list, initialization over LAN 10/100 Mbit/s; with electronic manual on DVD	6GK7 343-1EX30-0XE0	SOFTNET-S7 Edition 2007 for Industrial Ethernet up to 64 connections <ul style="list-style-type: none"> Single license for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade from V6.4 to 2007 edition Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition
		6GK1 704-1CW70-3AA0 6GK1 704-1CW00-3AL0 6GK1 704-1CW00-3AE0 6GK1 704-1CW00-3AE1
IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10	SOFTNET-S7 Lean Edition 2007 for Industrial Ethernet up to 8 connections <ul style="list-style-type: none"> Single License for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade from V6.4 to 2007 edition Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition
		6GK1 704-1LW70-3AA0 6GK1 704-1LW00-3AL0 6GK1 704-1LW00-3AE0 6GK1 704-1LW00-3AE1
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A	
SCALANCE X204-2 Industrial Ethernet switch Industrial Ethernet switches with integral SNMP access, online diagnostics, copper cable diagnostics and PROFINET diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports	6GK5 204-2BB10-2AA3	S7-1613 Edition 2007 Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, SP2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English <ul style="list-style-type: none"> Single License for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade S7-1613 from V6.4 to 2007 Edition Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 Edition 2007
Compact Switch Module CSM 377 Unmanaged switch for connection of a SIMATIC S7-300-CPU, ET 200M and as many as three further nodes to Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module including electronic device manual on CD-ROM	6GK7 377-1AA00-0AA0	6GK1 716-1CB70-3AA0 6GK1 716-1CB00-3AL0 6GK1 716-1CB00-3AE0 6GK1 716-1CB00-3AE1
IE FC RJ45 Plug 145 RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 145° cable outlet <ul style="list-style-type: none"> 1 pack = 1 unit 1 pack = 10 units 1 pack = 50 units 	6GK1 901-1BB30-0AA0 6GK1 901-1BB30-0AB0 6GK1 901-1BB30-0AE0	
SOFTNET Edition 2007 for Industrial Ethernet Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32 bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; German/English		STEP 7 Version 5.4 <i>Target system:</i> SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC <i>Requirement:</i> Windows 2000 Prof./XP Prof. <i>Delivery package:</i> German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation <ul style="list-style-type: none"> Floating License on CD Rental license for 50 hours Software Update Service on CD (requires current software version) Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD Trial License STEP 7 V5.4; on CD, runs for 14 days
		6ES7 810-4CC08-0YA5 6ES7 810-4CC08-0YA6 6ES7 810-4BC01-0YX2 6ES7 810-4CC08-0YE5 6ES7 810-4CC08-0YA7

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Advanced

Overview



ISO	TCP/UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●	●	●	●	●	●	●

- Connection of SIMATIC S7-300/SINUMERIK 840D powerline to Industrial Ethernet
 - Multi-protocol operation with TCP and UDP transport protocol
 - Adjustable Keep Alive function
- Two separate interfaces (integrated network separation):
 - Gigabit interface with an RJ45 connection with 10/100/1000 Mbit/s full/half duplex with auto-sensing functionality
 - PROFINET interface with two RJ45 connections with 10/100 Mbit/s full/half duplex with auto-sensing and auto-crossover functionality via integrated 2-port switch
- Communication services via both interfaces:
 - Open communication (TCP/IP and UDP): Multicast for UDP, incl. routing between both interfaces
 - PG/OP communication: Cross-network by means of S7 routing
 - S7 communication (client, server, multiplexing) incl. routing between both interfaces
 - IT communication: HTTP communication allows access to process data via own web sites; e-mail client function, sending of e-mails with authentication directly from the user program; FTP communication allows program-controlled FTP client communication; access to data blocks via FTP servers
- Communication services via PROFINET interfaces:
 - PROFINET IO Controller and IO Device with real-time properties (RT and IRT)¹⁾
 - PROFINET CBA
 - IP address assignment via DHCP, simple PC tool or via program block (e.g. for HMI)
 - Configuration with STEP 7
- Access protection by means of a configurable IP access list
- Module replacement without PG; all information is stored on the C-PLUG (also file system for IT functions)

¹⁾ Possible combinations in parallel mode:
 - IO Controller with IRT and IO Device with RT
 - IO Controller with RT and IO Device using IRT

- Extensive diagnostic functions for all modules in the rack
- IT communication
 - Web function
 - E-mail function
 - FTP
- Integration into network management systems through the support of SNMP V1 MIB-II

Benefits



- Very well suited for networks with linear topologies due to integrated 2-port switch
- Cost advantage due to two separate interfaces with network separation
- High degree of plant availability due to support from media redundancy (MRP)
- Investment protection for existing plants through the integration of SIMATIC S5 by means of open communication
- Optimal support of the maintenance by means of
 - Web-based diagnostics
 - Remote programming is possible due to the WAN characteristic of TCP/IP, even via the telephone network (e.g. ISDN)
 - Monitoring with IT network management tools (SNMP)
 - Swapping of modules without programming device via the swap medium C-PLUG (storage also file system for IT functions)
- Cost-effective access to process information with standard web browser; this cuts software costs on the client end
- Security: Protection against unauthorized access, without changing passwords, by means of device-oriented IP address lists; password protection for web applications
- Transmission of event-driven messages via IT communication paths by e-mail (incl. authentication)
- Plant-wide time synchronization via NTP or SIMATIC process with adjustable path selection
- Accessibility of many stations by means of free UDP connections or multicast functions
- Easy, quick exchange of data of the SIMATIC S7-300 with field devices via Industrial Ethernet through use as a PROFINET IO Controller with RT and IRT characteristics according to the standard
- Easy, quick exchange of data of the SIMATIC S7-300 with other programmable controllers by connecting as a PROFINET IO Device with RT and IRT characteristics according to the standard
- Time and cost savings in modular machine building and plant engineering with PROFINET CBA
- Easy, universal coupling of the PLC to various computers via FTP
- File system as cost-effective mass storage for data, log files and statistics (C-PLUG as a swap medium)
- Setting of own IP parameters of series machines without STEP 7
- Use of socket interface in the partner system without RFC 1006 is possible

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Advanced

2

Application

The CP 343-1 Advanced is the communications processor for connecting the SIMATIC S7-300 and SINUMERIK 840D power-line to the Industrial Ethernet.

With its own processor, the CP relieves the CPU of communications tasks and provides additional connections.

The CP 343-1 Advanced permits communication of the S7-300 with:

- PG/PC
- Master computer
- HMI devices
- SIMATIC S5/S7/C7 systems
- PROFINET IO Devices and IO Controller
- PROFINET CBA components

PROFINET CBA is used to create reusable technology modules.

Design

The CP 343-1 Advanced offers all the advantages of the SIMATIC S7-300 design:

- Compact construction; the rugged plastic enclosure features the following on the front panel:
 - Three RJ45 jacks for connecting to Industrial Ethernet via two independent interfaces; automatic data rate detection by means of the auto-sensing and auto-crossover function; the connection is made via the IE FC RJ45 Plug 180 with 180° cable outlet or via a standard patch cable
 - 2-pin plug-in terminal strip for connection of the 24 V DC external supply voltage
 - Diagnostics LEDs for indicating the operational and communication status
- Easy installation; the CP 343-1 Advanced is installed on the mounting rail of the S7-300 and is connected to adjacent modules via the bus connector. No slot rules apply in this case.
- The CP 343-1 Advanced can be operated without a fan; no backup battery is necessary.
- In combination with IM 360/361, the CP 343-1 Advanced can also be used in an expansion rack (ER).
- The module can be replaced without a programming device
- The C-PLUG (configuration plug) is included in the scope of delivery as replacement medium (operation without C-PLUG is not possible)

Function

The CP 343-1 Advanced independently handles data traffic over Industrial Ethernet. The module has its own processor and can be put into service directly using the unique preset Ethernet address (MAC) via the network.

Support of the DHCP (Dynamic Host Configuration Protocol) enables the IP address to be assigned from a central DHCP server.

For connection control (Keep Alive) it is possible to configure an adjustable time for all TCP transport connections for active and passive peers.

The CPU's time can be set via NTP or SIMATIC procedures with an accuracy of approx. ± 1 s.

The CP 343-1 Advanced works in multi-protocol mode for the following communication services:

PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing; with the aid of S7 routing it is possible to utilize programming device communication across networks.

S7 communication

For connecting the S7-300 (server and client) to S7-200/300/400 (server and client), HMI units and PCs (SOFTNET-S7 or CP 1613 A2/CP 1623 with S7-1613).

Open communication

On the basis of layer 4, open communication with SEND/RECEIVE offers a simple and optimized interface for data communication. Up to 8 KB of data can be transmitted in one call.

This interface enables

- ISO transport connections
- TCP transport connections
 - TCP with RFC 1006
 - TCP without RFC 1006
- UDP
 - Multicast for UDP

to be used.

Open communication is used for communication with SIMATIC S5, SIMATIC S7-400/300 and computers/PCs.

The function blocks required are a component part of STEP 7 for Industrial Ethernet and must be integrated into the S7 user program.

Open communication with FETCH/WRITE allows direct access to the CPU data of the SIMATIC S7 (in the same way as in the CP 1430 TCP and the SIMATIC S5). This means existing HMI systems can still be used.

If UDP is used as the transmission protocol, the multicast function can be used to simultaneously send and receive on configured multicast circuits.

PROFINET communication

- PROFINET IO Controller; real-time communication with field devices and PC-based IO Devices (e.g. with CP 1616 or CP 1604) over Industrial Ethernet according to PROFINET standard with RT and IRT real-time properties.
- PROFINET IO Device; the CP 343-1 Advanced can be operated as a PROFINET IO Device for exchanging data from the user program of the S7-300 station like a field device (as input and output data) with a PROFINET IO Controller. This high-performance data exchange using PROFINET I/O communication mechanisms with real-time properties is handled by the CP 343-1 Advanced on its own. Access by means of I/O data from the user program of the S7-300 station is through the PNIO_SEND and PNIO_RECV blocks.
- PROFINET CBA; communication between technological modules (distributed intelligence); the user can choose between cyclic and acyclic communication.

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Advanced

Function (continued)

IT functions

- IP routing; forwarding of IP V4 messages between Gigabit and PROFINET interface regulated by IP access list
- WEB server; up to 30 MB of freely definable HTML pages can be called up via a standard browser; data handling of own file system via FTP
- Standard diagnostics pages; for quick diagnostics on the system for all of the modules plugged into the rack, without additional tools
- E-mails; sending of e-mails with authentication directly from the user program. The e-mail client function allows user alerting directly from the control program
- Communication via FTP; open protocol which is available on most operating system platforms
- The 30 MB RAM file system can be used for the buffer storage of dynamic data.

Diagnostics

Comprehensive diagnostics are made available via STEP 7 and the web, among others:

- Operating status of the CP
- Diagnostics of the assigned PROFINET field devices (also in the user program)
- General diagnostics and statistics functions
- Connection diagnostics
- LAN controller statistics
- Information about each port
- Diagnostic buffer

Diagnostic capabilities in operation

- Status query of connections via function block
- Integration into network management systems through the support of SNMP V1 MIB-2 objects; this allows the current status of the Ethernet interface to be called up, e.g. for network management.
- Web interface with simple diagnostic functions and diagnostics buffer of the CP and CPU in plain text
Clock synchronization using SIMATIC procedure or NTP (network time protocol) with selectable path. The CPU's time can be set with an accuracy of approx. ± 1 s.

Security

With a configurable IP access list, PCs and automation devices can be released in a targeted manner for IP-based access to the CP or the controller.

Web sites can be password protected.

Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the CP 343-1.

For creating PROFINET CBA components, the engineering tool SIMATIC iMap as of V 3.0 + SP1 is also required.

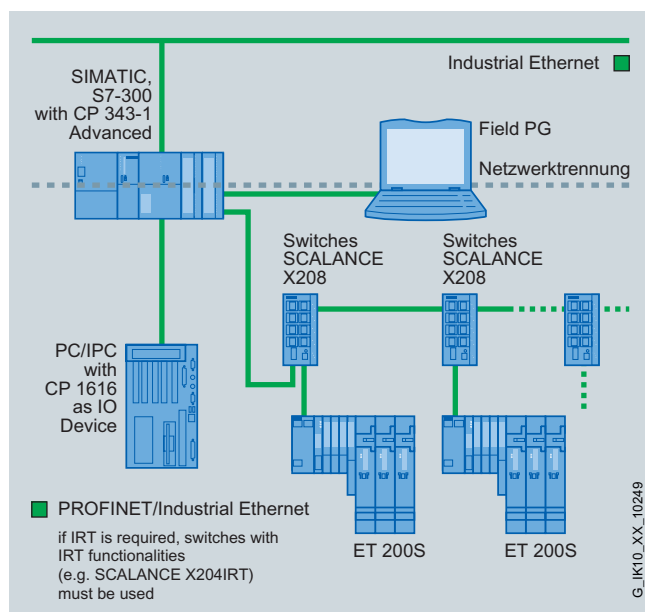
The configuring data of the CP created with STEP 7 is saved on the CPU. The storage volume of the S7 CPU must be observed, however.

The user-specific HTML pages, FTP data and CBA interconnection information created with SIMATIC iMAP are saved on the swap medium C-PLUG (configuration plug).

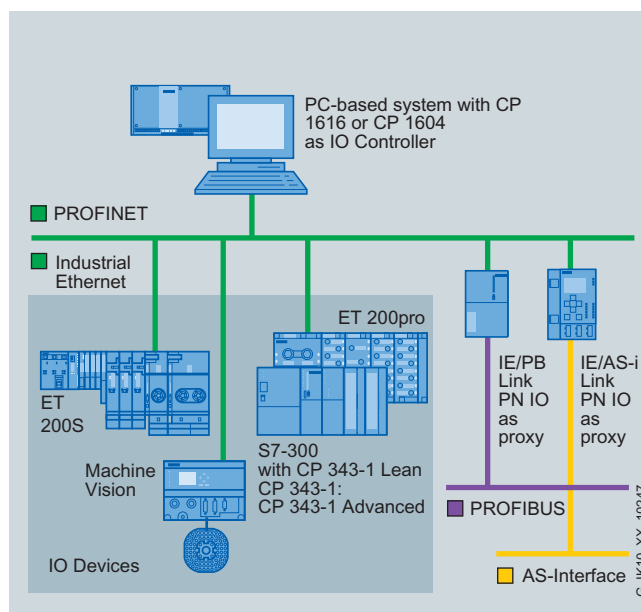
The CP can be swapped in the event of failure without a programming device, because the relevant user and configuration data is saved on the CPU or on the C-PLUG.

The function blocks and the programmable communication block (S7 client) required for communication are included in the delivery kit of STEP 7 or can be downloaded from the Internet.

Integration



Connection to higher-level network



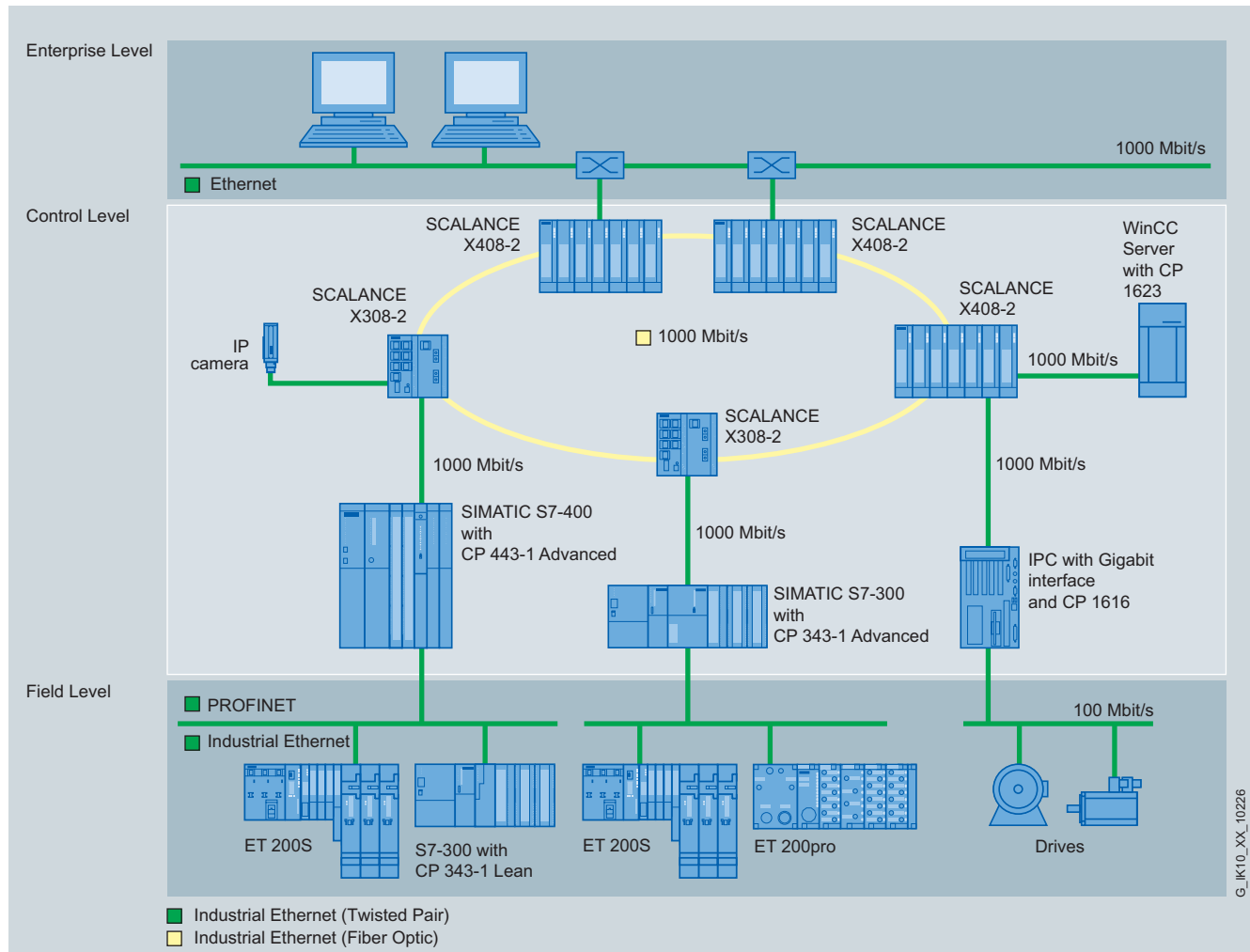
Connection to higher-level network and PC-based system

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Advanced

Integration (continued)



Gigabit communication in the control level

Technical specifications

Order No.	6GK7 343-1GX30-0XE0
Product type description	CP 343-1 Advanced
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	1 000 Mbit/s
Transmission rate at Interface 2	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Electrical connection version	
• at Industrial Ethernet interface 1	1 x RJ45 (TP)
• at Industrial Ethernet interface 2	2 x RJ45 (TP)
• for voltage supply	2-pin plug-in terminal strip
Slot version of the swap medium	C-PLUG

Order No.	6GK7 343-1GX30-0XE0
Product type description	CP 343-1 Advanced
Supply voltage	
Type of supply voltage	DC
Supply voltage	24 V
• Relative positive tolerance at 24 V DC	20 %
• Relative negative tolerance at 24 V DC	15 %
Current consumption	
Current consumed	
• from backplane bus at 5 V DC typical	140 mA
• from external supply voltage at 24 V DC typical	-
• from external supply voltage at 24 V DC max.	620 mA

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Advanced

Technical specifications (continued)

Order No.	6GK7 343-1GX30-0XE0
Product type description	CP 343-1 Advanced
Effective power loss	
Effective power loss	14.7 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 ... +60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	Compact module S7-300, double width
• Width	80 mm
• Height	125 mm
• Depth	120 mm
Net weight	600 g
Performance data	
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. ¹⁾	16
Number of multicast stations	16
Data volume as useful data for open communication by means of SEND/RECEIVE blocks	
• per ISO connection, max.	8 KB
• per ISO on TCP connection, max.	8 KB
• per TCP connection, max.	8 KB
• per UDP connection, max.	2 KB
S7 communication	
Number of possible connections for S7 communication, max.	16
PG/OP communication	
Number of possible connections for S7 communication for OP connections, max.	16
Multi-protocol operation	
Number of active connections in multi-protocol operation	48

¹⁾ also S5-compatible communication

Order No.	6GK7 343-1GX30-0XE0
Product type description	CP 343-1 Advanced
IT functions	
Number of possible connections as client by means of FTP, max.	10
Number of possible connections as server by means of FTP, max.	2
Number of possible connections as server by means of HTTP, max.	4
Number of possible connections to an e-mail server as e-mail client, max.	1
Data volume as useful data (incl. e-mail header information) for e-mail communication by means of SEND/RECEIVE blocks	8 KB
Memory capacity of the user memory	
• as Flash memory file system	28 MB
• as RAM	30 MB
Number of possible write cycles of the flash memory cells	100 000
Performance data, PROFINET communication as PN IO controller	
Number of PN IO devices operable on PROFINET IO controller	128
• of which, PN IO IRT devices	32
Number of external PN IO lines with PROFINET per subrack	1
Data volume	
• as useful data for input variables as PROFINET IO controller, max.	4 KB
• as useful data for output variables as PROFINET IO controller	4 KB
• as useful data for input variables per PN IO device as PROFINET IO controller	240 bytes
• as useful data for output variables per PN IO device as PROFINET IO controller	240 bytes
Performance data PROFINET communication as PN IO-Device	
Data volume	
• as useful data for input variables as PROFINET IO device, max.	1 KB
• as useful data for output variables as PROFINET IO device, max.	1 KB
• as useful data for input variables per sub-module as PROFINET IO device, max.	240 bytes
• as useful data for output variables per sub-module as PROFINET IO device, max.	240 bytes
• as useful data for the consistency area for each sub-module	240 bytes
Number of sub-modules per PROFINET IO device	32

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Advanced

Technical specifications (continued)

Order No.	6GK7 343-1GX30-0XE0	Order No.	6GK7 343-1GX30-0XE0
Product type description	CP 343-1 Advanced	Product type description	CP 343-1 Advanced
Performance data PROFINET CBA Number of remote interconnection partners in the case of PROFINET CBA Total number of interconnections in the case of PROFINET CBA Data volume • as useful data for digital inputs in the case of PROFINET CBA, max. • as useful data for digital outputs in the case of PROFINET CBA, max. • as useful data for arrays and data types - in case of acyclic transmission with PROFINET CBA, max. - in case of cyclic transmission with PROFINET CBA, max. - in case of local interconnection with PROFINET CBA, max.		Performance data PROFINET CBA, HMI variables via PROFINET (acyclic) Number of HMI stations with login capability for HMI variables in the case of acyclic transmission with PROFINET CBA Send cycle of the HMI variables in the case of acyclic transmission with PROFINET CBA Send cycle of the HMI variables in the case of acyclic transmission with PROFINET CBA max. Data volume as useful data for HMI variables in the case of acyclic transmission with PROFINET CBA max.	
	64 1 000 8 KB 8 KB 8 KB 250 bytes 2 400 bytes		3 500 ms 200 8 KB
Performance data PROFINET CBA, remote interconnections with acyclic transmission Send cycle of the remote interconnections in the case of acyclic transmission with PROFINET CBA min. Number of remote interconnections • with input variables in case of acyclic transmission with PROFINET CBA, max. • with output variables in case of acyclic transmission with PROFINET CBA, max. Data volume • as useful data for remote interconnections with input variables in the case of acyclic transmission with PROFINET CBA • as useful data for remote interconnections with output variables in the case of acyclic transmission with PROFINET CBA		Performance data PROFINET CBA, device-internal interconnections Number of internal interconnections in the case of PROFINET CBA, max Data volume of internal interconnections in the case of PROFINET CBA, max Performance data PROFINET CBA, interconnections with constants Number of interconnections with constants in the case of PROFINET CBA, max Data volume as useful data for interconnections with constants in the case of PROFINET CBA, max	
	100 ms 128 128 8 KB 8 KB		256 2 400 bytes 200 4 096 bytes
Performance data PROFINET CBA, remote interconnections with cyclic transmission Send cycle of the remote interconnections in the case of cyclic transmission with PROFINET CBA min. Number of remote interconnections • with input variables in case of cyclic transmission with PROFINET CBA, max. • with output variables in case of cyclic transmission with PROFINET CBA, max. Data volume • as useful data for remote interconnections with input variables in the case of cyclic transmission with PROFINET CBA, max. • as useful data for remote interconnections with output variables in the case of cyclic transmission with PROFINET CBA, max.		Performance data PROFINET CBA, PROFIBUS proxy functionality Product function in the case of PROFINET CBA, PROFIBUS proxy functionality Number of accesses to S7-extended variables in case of PROFINET CBA max. Configuration Configuration software for full functional scope STEP 7 V5.4 SP4 or higher	
	8 ms 200 200 2 000 bytes 2 000 bytes		No 32 Yes

2

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Advanced

2

Ordering data

Order No.

Order No.

CP 343-1 Advanced communications processor

6GK7 343-1GX30-0XE0

For the connection of SIMATIC S7-300 to Industrial Ethernet; PROFINET IO Controller and IO Device with RT and IRT, MRP, PROFINET CBA, TCP/IP and UDP, S7 communication, open communication (SEND/RECEIVE), FETCH/WRITE, with and without RFC 1006, diagnostic expansions, multicast, web server, HTML diagnostics, FTP server, FTP client, e-mail client, setting of CPU's clock using SIMATIC and NTP procedures, access protection through IP access list, SNMP, DHCP, initialization over LAN 10/100 Mbit/s; with electronic manual on DVD

C-PLUG

6GK1 900-0AB00

Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot

SOFTNET Edition 2007 for Industrial Ethernet

Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English

SOFTNET-S7 Edition 2007 for Industrial Ethernet

up to 64 connections

- Single License for 1 installation
- Software Update Service for 1 year, with automatic extension; requirement: Current software version
- Upgrade from V6.4 to 2007 edition
- Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition

6GK1 704-1CW70-3AA0
6GK1 704-1CW00-3AL0

6GK1 704-1CW00-3AE0

6GK1 704-1CW00-3AE1

SOFTNET-S7 Lean Edition 2007 for Industrial Ethernet

up to 8 connections

- Single License for 1 installation
- Software Update Service for 1 year, with automatic extension; requirement: Current software version
- Upgrade from V6.4 to 2007 edition
- Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition

6GK1 704-1LW70-3AA0
6GK1 704-1LW00-3AL0

6GK1 704-1LW00-3AE0

6GK1 704-1LW00-3AE1

S7-1613 Edition 2007

Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English

- Single License for 1 installation
- Software Update Service for 1 year, with automatic extension; requirement: Current software version

6GK1 716-1CB70-3AA0

6GK1 716-1CB00-3AL0

- Upgrade S7-1613 from V6.4 to S7-1613 2007 Edition

6GK1 716-1CB00-3AE0

- Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 2007 Edition

6GK1 716-1CB00-3AE1

IE FC RJ45 Plug 180

RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

IE FC RJ45 Plug 4 x 2

RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB11-2AA0

6GK1 901-1BB11-2AB0

6GK1 901-1BB11-2AE0

Compact Switch Module CSM 377

6GK7 377-1AA00-0AA0

Unmanaged switch for connection of a SIMATIC S7-300-CPU, ET 200M and as many as three further nodes to Industrial Ethernet operating at 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module including electronic equipment manual on CD-ROM

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 343-1 Advanced

Ordering data (continued)	Order No.	Order No.
SCALANCE X204-2 Industrial Ethernet switch with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports	6GK5 204-2BB10-2AA3	SIMATIC iMap V3.0 for configuring PROFINET CBA, <i>Requirement:</i> Windows 2000 Prof. with Service Pack 4 or later or Windows XP Prof. with Service Pack 1 or later or Windows 2003 Server with Service Pack 1 or later; on PG or PC with Pentium proces- sor, min. 1 GHz; STEP 7 V5.3 or later with Service Pack 3, PN OPC Server V6.3 or later <i>Type of supply:</i> German, English, with electronic documentation • Single License • Software Update Service • Upgrade to V3.0, Single License
Industrial Ethernet switch SCALANCE X308-2 2 x 1000 Mbit/s multimode fiber-optic ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cables (multimode) up to a max. 750 m.	6GK5 308-2FL00-2AA3	6ES7 820-0CC04-0YA5 6ES7 820-0CC01-0YX2 6ES7 820-0CC04-0YE5
STEP 7 Version 5.4 <i>Target system:</i> SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC <i>Requirement:</i> Windows 2000 Prof./XP Prof. <i>Delivery package:</i> German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation • Floating license on CD • Rental license for 50 hours • Software Update Service on CD (requires current software version)	6ES7 810-4CC08-0YA5 6ES7 810-4CC08-0YA6 6ES7 810-4BC01-0YX2	

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1

Overview



ISO	TCP/ UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●	●	●			●	●

- Connection of SIMATIC S7-400 to Industrial Ethernet
 - 2 x RJ45 interface for 10/100 Mbit/s full/half duplex connection with autosensing/autonegotiation and autocrossover function
 - Integrated real-time switch ERTEC with two ports
 - Multi-protocol operation for ISO, TCP/IP, UDP and PROFINET IO protocols
 - Adjustable Keep Alive function
- Communication services:
 - Open communication (ISO, TCP/IP and UDP)
 - PROFINET IO Controller with real-time properties RT and IRT
 - PG/OP communication: Across networks by means of S7 routing
 - S7 communication
- Multicast for UDP
- Access protection by means of configurable access list
- Support for fail-safe programmable controllers in combination with SIMATIC S7-400 CPU 416F-3PN/DP
- Module replacement without PG
- SIMATIC H system operation for redundant S7 communication
- Configuration with STEP 7
- Diagnostic possibilities in STEP 7 and with web browser
- Automatic setting of the CPU clock by means of Industrial Ethernet with NTP or SIMATIC procedure
- Integration of network management systems via SNMP (MIB II diagnostic information)

Benefits



- Ideally suited for use in networks with line topology through integral real-time switch with two ports
- High plant availability through the support of media redundancy (MRP) and use in the SIMATIC H system
- Investment protection for existing plants through the integration of the SIMATIC S7-400 by means of the open communication
- Easy, quick exchange of data of the SIMATIC S7-400 with field devices via Industrial Ethernet through use as a PROFINET IO Controller with RT and IRT characteristics according to the standard
- Security:
 - Protection without the need for changing passwords through device-oriented IP address lists
- Diagnostics capabilities in STEP 7, with web-based diagnosis and SNMP V2
- Component exchange without programming device, since all information is stored on the CPU.
- One module for various applications:
 - Programming device/PC, HMI systems, SIMATIC S5/S7 (high-priority)
- Remote programming is possible due to the WAN characteristic of TCP/IP, even via the telephone network (e.g. ISDN)
- System-wide synchronization via NTP with adjustable path selection or SIMATIC procedures
- Setting of intrinsic IP parameters of series machines without STEP 7
- Support for fail-safe programmable controllers in combination with SIMATIC S7-400 CPU 416F-3PN/DP
- Accessibility of many nodes by means of free UDP connections or multicast functions
- Use of the socket interface in the partner system is possible without RFC 1006

Application

The CP 443-1 is the communications processor for SIMATIC S7-400 for Industrial Ethernet. With its own processor, it relieves the CPU of communications tasks and facilitates additional connections.

The CP 443-1 permits communication of the S7-400 with:

- Programming devices, computers, HMI devices
- Host computers
- Other SIMATIC S7 systems
- SIMATIC S5 programmable controllers
- Field devices (PROFINET IO Devices)
- Third-party devices

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1

Design

The CP 443-1 features all the advantages of the SIMATIC S7-400 design:

- Compact design;
on the front, the rugged plastic housing features:
 - Two RJ45 sockets for connection to Industrial Ethernet 100 MBit/s with automatic sensing of the data transmission rate by means of Autosensing/Autonegotiation;
The RJ45 sockets are industrially compatible and designed with additional sleeves for connecting to the IE FC RJ45 Plug 180 or a standard patch line
 - Diagnostic LEDs for indication of the operating and communication status for each switch port
- Easy installation:
The CP 443-1 is mounted on the S7-400 rack and connected to other modules of the S7-400 by means of the backplane bus. No slot rules apply.
- The CP 443-1 can be operated without a fan
- In combination with the IM 460/461, the CP 443-1 can also be used in an expansion rack
- Module replacement possible without programming device (PG)
- General and port-specific LEDs for indicating the operating and communication status

Function

The CP 443-1 independently handles data traffic over Industrial Ethernet. The module has its own powerful processor and can be put into service directly using the unique preset Ethernet address (MAC) via the network.

Support of the DHCP (Dynamic Host Configuration Protocol) enables the IP address to be issued from a central DHCP server.

For connection control (keep alive) it is possible to configure an adjustable time for all TCP transport connections for active and passive partners.

The CPU's time can be set using NTP with an accuracy of approx. ± 1 s.

The CP 443-1 works in multi-protocol mode for the following communication services:

PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing
With the aid of S7 routing it is possible to use programming device communication across networks.

PROFINET communication

- *PROFINET IO Controller*;
real-time communication with field devices, including PC-based IO Devices (with CP 1616 or CP 1604) on Industrial Ethernet with PROFINET standard with RT and IRT.
- The prioritized start-up of IO Devices allows quick starting of defined devices.

S7 communication

- For connecting to S7-200/300/400 (server and client), HMI devices and PCs (SOFTNET-S7 or CP 1613 A2/CP 1623 with S7-1613)

Communication takes place through the CP 443-1 without further configuration.

- H communication;
For redundant S7 communication, the CP 443-1 can also be used in SIMATIC H systems as of V4.5. In this way, H systems can also be connected redundantly to PC systems (with CP 1613 A2/CP 1623 and S7-REDCONNECT).
- Clock synchronization;
Using SIMATIC procedure or NTP (network time protocol) with selectable path.

Open communication

On the basis of layer 4, the open communication with SEND/RECEIVE offers a simple and optimized interface for data communication.

Up to 8 KB of data can be transmitted in one call.

This interface enables the following to be used:

- ISO transport connections
- TCP connections with or without RFC 1006
- UDP (2 KB data length)
- UDP Multicast (2 KB data length)

Open communication is used with SIMATIC S5 and computers/PCs. The function calls required are a component part of STEP 7 and must be integrated into the S7 user program.

Open communication with FETCH/WRITE allows direct access to the CPU data in the same way as in the CP 1430. This means existing HMI systems can still be used.

Security

With a freely configurable access list, specific users and programmable controllers can be enabled for accessing the CP or control via TCP/IP.

Diagnostics

Comprehensive diagnostic options are available via STEP 7 or a web browser, including:

- General diagnostics and statistics functions
- Connection diagnostics
- Diagnosis of the assigned PROFINET field devices (also in the user program)
- LAN controller statistics
- Information about every port of the switch
- Diagnostic buffer
- Web diagnostics with easy diagnostic functions
- Operating status of CP

Diagnostics possibilities during operation

- Status scanning of connections using function block
- SNMP MIB-2 objects;
the current status of the Ethernet interface can then be called, e.g. for network management

Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the CP 443-1.

The configuration data of the CP created with STEP 7 is stored on the CPU. Attention must however be paid to the memory volume of the S7-CPU.

Configuration and programming of all SIMATIC S7 controllers connected to the network is possible over the network.

The CP can be replaced in the event of failure without the need for a programming device because the relevant user and configuration data are saved on the CPU.

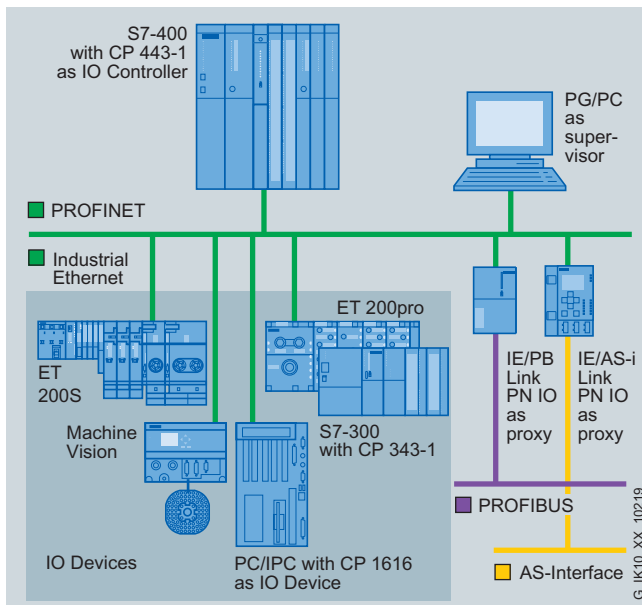
PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

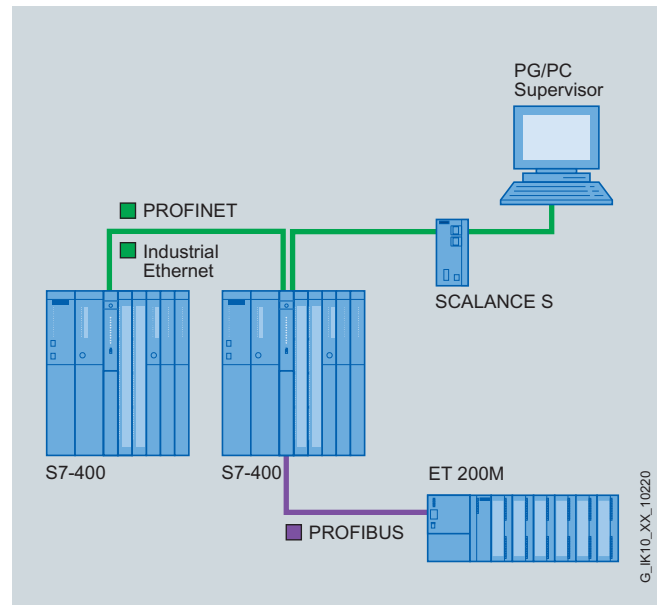
CP 443-1

Integration

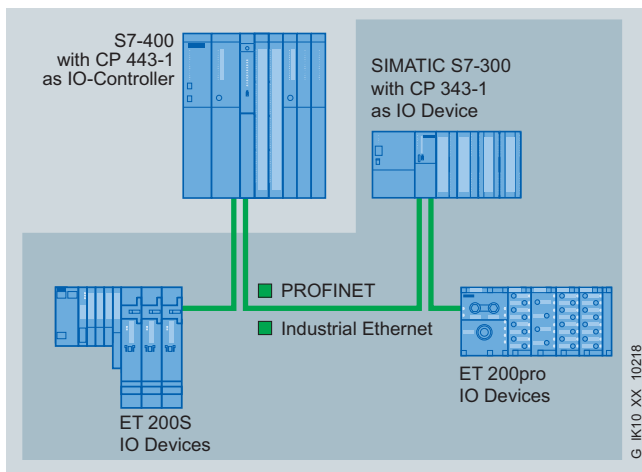
2



Interfacing to higher-level network with CP 443-1 as PROFINET IO controller



Line structure at the superordinated control level through integrated 2-port switch



Line structure as PROFINET IO controller with integrated real-time switch

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1

Technical specifications

Order No.	6GK7 443-1EX20-0XE0
Product type description	CP 443-1
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Version of electrical connection to the Industrial Ethernet interface 1	2 x RJ45 (TP)
Supply voltage	
Type of supply voltage	DC
Supply voltage	5 V
Relative symmetrical tolerance at 5 V DC	5%
Current consumption	
Current consumed from backplane bus at 5 V DC, typical	1,4 A
Effective power loss	
Effective power loss	8,6 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 ... +60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	S7-400 compact module, single width
• Width	25 mm
• Height	290 mm
• Depth	210 mm
Net weight	700 g

Order No.	6GK7 443-1EX20-0XE0
Product type description	CP 443-1
Performance data	
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. ³⁾	64 ²⁾
Data volume as useful data for open communication by means of SEND/RECEIVE blocks	
• per ISO connection, max.	8 KB
• per ISO on TCP connection, max.	8 KB
• per TCP connection, max.	8 KB
• per UDP connection, max.	2 KB
Number of possible connections for open communication by means of T blocks, max.	64
Data volume as useful data for open communication by means of T-blocks	
• per ISO on TCP connection, max.	1 452 bytes
S7 communication	
Number of possible connections for S7 communication	
• Maximum	128 ¹⁾
• for PG connections, maximum	2
• for OP connections, maximum	30
Multi-protocol operation	
Number of active connections in multi-protocol operation	128
Performance data, PROFINET communication as PN IO controller	
Number of PN IO devices operable on PROFINET IO controller	128
Number of external PN IO lines with PROFINET per subrack	4
of which, PN IO IRT devices	32
Data volume	
• as useful data for input variables as PROFINET IO controller	4 KB
• as useful data for output variables as PROFINET IO controller	4 KB
• as useful data for input variables per PN IO device as PROFINET IO controller	240 bytes
• as useful data for output variables per PN IO device as PROFINET IO controller	240 bytes
Configuration	
Configuration software for full functional scope STEP 7 V5.4 SP4 or higher	Yes

¹⁾ when using several CPUs²⁾ depending on the CPU type³⁾ also S5-compatible communication

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1 Advanced

2

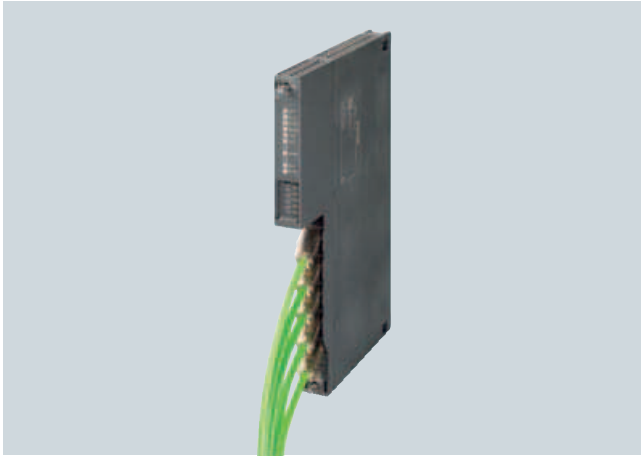
Ordering data	Order No.	Order No.
CP 443-1 communications processor For connecting SIMATIC S7-400 to Industrial Ethernet through TCP/IP, ISO and UDP; PROFINET IO Controller, integrated real-time switch ERTEC with two ports; 2 x RJ45 interface; S7 communication, open communication (SEND/RECEIVE) with FETCH/WRITE, with and without RFC 1006, DHCP, SNMP V2, diagnostics, multicast, access protection over IP access list, initialization over LAN 10/100 Mbit/s with electronic manual on DVD	6GK7 443-1EX20-0XE0	SOFTNET-S7 Lean Edition 2007 for Industrial Ethernet up to 8 connections <ul style="list-style-type: none"> Single license for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade from V6.4 to 2007 Edition Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition
IE FC TP Standard Cable GP 2x2 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter	6XV1 840-2AH10	S7-1613 Edition 2007 Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English <ul style="list-style-type: none"> Single license for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade S7-1613 from V6.4 to 2007 Edition Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 Edition 2007
FO Standard Cable GP (50/125) Standard cable, splittable, UL approval, sold by the meter	6XV1 873-2A	
SCALANCE X204-2 Industrial Ethernet switch Industrial Ethernet switches with integral SNMP access, online diagnostics, copper cable diagnostics for configuring line, star and ring topologies; four 10/100 Mbit/s RJ45 ports and two FO ports	6GK5 204-2BB10-2AA3	
IE FC RJ45 Plug 180 RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface <ul style="list-style-type: none"> 1 pack = 1 unit 1 pack = 10 units 1 pack = 50 units 	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0	STEP 7 Version 5.4 <i>Target system:</i> SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC <i>Requirement:</i> Windows 2000 Prof./XP Prof. <i>Delivery package:</i> German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation <ul style="list-style-type: none"> Floating license on CD Rental license for 50 hours Software Update Service on CD (requires current software version) Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD Trial License STEP 7 V5.4; on CD, runs for 14 days
SOFTNET Edition 2007 for Industrial Ethernet Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; German/English		6GK1 704-1LB70-3AA0 6GK1 704-1LB70-3AL0 6GK1 704-1LB70-3AE0 6GK1 704-1LB70-3AE1
SOFTNET-S7 Edition 2007 for Industrial Ethernet up to 64 connections <ul style="list-style-type: none"> Single license for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade from V6.4 to 2007 edition Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition 	6GK1 704-1CW70-3AA0 6GK1 704-1CW70-3AL0 6GK1 704-1CW70-3AE0 6GK1 704-1CW70-3AE1	6ES7 810-4CC08-0YA5 6ES7 810-4CC08-0YA6 6ES7 810-4BC01-0YX2 6ES7 810-4CC08-0YE5 6ES7 810-4CC08-0YA7

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1 Advanced

Overview



ISO	TCP/ UDP	PN	MRP	IT	IP-R	PG/OP	S7/S5
●	●	●	●	●	●	●	●

- Connection of SIMATIC S7-400 to Industrial Ethernet
 - Multi-protocol operation for ISO, TCP/IP, UDP and PROFINET IO protocols
 - Adjustable Keep Alive function
- Two separate interfaces (integrated network separation):
 - Gigabit interface with an RJ45 connection with 10/100/1000 Mbit/s full/half duplex with auto-sensing functionality
 - PROFINET interface with four RJ45 connections with 10/100 Mbit/s full/half duplex with auto-sensing and auto-crossover functionality via integrated 4-port switch
- Communication services via both interfaces
 - Open communication (ISO, TCP/IP and UDP), Multicast with UDP, incl. routing between two interfaces
 - PG/OP communication:
 - Cross-network by means of S7 routing
 - S7 communication (client, server, multiplexing) incl. routing between both interfaces
 - IT communication:
 - HTTP communication allows access to process data via own web sites;
 - e-mail client function, sending of e-mails with authentication directly from the user program;
 - FTP communication allows program-controlled FTP client communication;
 - access to data blocks via FTP servers
- Communication services via PROFINET interface
 - PROFINET IO Controller with real-time properties (RT and IRT)
 - PROFINET CBA
 - IP address assignment via DHCP, simple PC tool or via the user program (e.g. HMI)
 - Support of prioritized start-ups of PROFINET IO Devices
- Configuration with STEP 7
- Access protection by means of a configurable IP access list
- Module replacement without PG; all information is stored on the C-PLUG (also file system for IT functions)
- Extensive diagnostic functions for all modules in the rack
- Integration into network management systems through the support of SNMP V1 MIB-II
- Operation in SIMATIC H system for redundant S7 communication
- Operation in fail-safe applications (PROFIsafe) together with SIMATIC S7-400 CPU 416F

Benefits



- Ideally suited for setting up small local networks by means of an integrated 4-port switch, which saves installation space in the control cabinet.
- Cost advantage due to network separation
- High plant availability through the support of media redundancy (MRP) and use in the SIMATIC S7-400 H system
- Investment protection for existing plants through the integration of SIMATIC S5 by means of open communication
- Optimal support of the maintenance by means of
 - Web-based diagnostics
 - Remote programming is possible due to the WAN characteristic of TCP/IP, even via the telephone network (e.g. ISDN)
 - Monitoring with IT network management tools (SNMP)
 - Swapping of modules without programming device via the swap medium C-PLUG (storage also file system for IT functions)
- Cost-effective access to process information with standard web browser; this cuts software costs on the client end
- Security:
 - Protection against unauthorized access, without changing passwords, by means of device-oriented IP address lists;
 - password protection for web applications
- Plant-wide time synchronization via NTP or SIMATIC process with adjustable path selection
- Accessibility of many stations by means of free UDP connections or multicast functions
- Easy, quick exchange of data of the SIMATIC S7-400 with field devices via Industrial Ethernet through use as a PROFINET IO Controller with RT and IRT characteristics according to the standard
- Time and cost savings in modular machine building and plant engineering with PROFINET CBA
- Easy, universal coupling of the PLC to various computers via FTP
- File system as cost-effective mass storage for data, log files and statistics (C-PLUG as a swap medium)
- Transmission of event-driven messages via IT communication paths by e-mail (incl. authentication)
- Setting of own IP parameters of series machines without STEP 7
- Use of socket interface in the partner system without RFC 1006 is possible

2

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1 Advanced

2

Application

The CP 443-1 Advanced is the communications module for connecting SIMATIC S7-400 to the Industrial Ethernet.

With its integral processor, it takes communications load off the CPU and allows additional connections.

The CP 443-1 Advanced provides the capability for the SIMATIC S7-400 to communicate with:

- PG/PC
- Master computer
- HMI devices
- SIMATIC S5/S7/C7 systems
- PROFINET CBA components
- PROFINET IO devices

PROFINET CBA allows the creation of reusable technology modules.

Design

The CP 443-1 Advanced offers all the advantages of the SIMATIC S7-400 design:

- The front panel of the rugged plastic enclosure includes:
 - Five RJ45 jacks for connecting to Industrial Ethernet via two independent interfaces; automatic data rate detection by means of the autosensing and autocrossover functions; the connection is made via the IE FC RJ45 Plug 180 with 180° cable outlet or via a standard patch cable
 - Diagnostics LEDs for indicating the operational and communication status
- Easy installation; the CP 443-1 Advanced is installed on the module rack of the S7-400 and is connected to other modules via the backplane bus. No slot rules apply in this case.
- The CP 443-1 Advanced can be operated without a fan.
- In combination with IM 460/461, the CP 443-1 Advanced can also be used in an expansion rack (ER).
- The module can be replaced without a programming device
- C-PLUG (configuration plug) is included in the scope of delivery as the replacement medium (cannot be operated without C-PLUG).
- General and port-specific LEDs for indicating the operating and communication status

Function

The CP 443-1 Advanced independently handles data traffic over Industrial Ethernet. The module has its own powerful processor and can be put into service directly using the unique preset Ethernet address (MAC) via the network.

Support of the DHCP (Dynamic Host Configuration Protocol) enables the IP address to be assigned from a central DHCP server.

For connection control (Keep Alive) it is possible to configure an adjustable time for the TCP transport connections for active and passive peers.

Multi-protocol operation of the transport protocols ISO, TCP/IP and UDP is possible.

The CP 443-1 Advanced works in multi-protocol mode for the following communication services:

PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing; with the aid of S7 routing it is possible to utilize programming device communication across networks.

S7 communication

for connecting the SIMATIC S7-200/300/400 (server and client) to SIMATIC S7-400 (server and client), HMI devices and PCs (SOFTNET-S7 or CP 1613 A2/CP 1623 with S7-1613). Communication takes place through the CP 443-1 Advanced without further configuration.

- H communication; for redundant S7 communication, the CP 443-1 Advanced can also be used in SIMATIC H systems as of CPU V4.5. In this way, H systems can also be connected redundantly to PC systems (with CP 1613 A2/CP 1623 and S7-REDCONNECT).
- Clock synchronization using SIMATIC procedure or NTP (network time protocol) with selectable path. The CPU's time can be set with an accuracy of approx. ± 1 s.

Open communication

Simple and optimized interface for data communication. Up to 8 KB of data can be transmitted in one call. On the basis of layer 4, open communication with SEND/RECEIVE offers a simple and optimized interface for data communication.

This interface enables

- ISO transport connections
- TCP connections with or without RFC 1006
- UDP (2 KB data length)
- UDP Multicast (2 KB data length)

to be used.

Open communication is used for communication with SIMATIC S5, SIMATIC S7-400/300 and computers/PCs. The function blocks required are a component part of STEP S7 and must be integrated into the S7 user program.

Open communication with Fetch/Write allows direct access to the CPU data of the SIMATIC S7 (in the same way as in the CP 1430TCP and SIMATIC S5). This means existing HMI systems can still be used. If UDP is used as the transmission protocol, the multicast function can be used to simultaneously send and receive in configured multicast circuits.

Function (continued)

PROFINET communication

PROFINET IO Controller;

real-time communication with field devices, including PC-based IO Devices (with CP 1616 or CP 1604) on Industrial Ethernet with PROFINET standard with RT and IRT.

The prioritized start-up of IO Devices allows defined devices to be quickly started up.

PROFINET CBA;

communication between technological modules (distributed intelligence); the user can choose between cyclic and acyclic communication.

This communication is suitable for time-critical and non-time-critical applications.

IT functions

- *IP routing;*
forwarding of IP V4 messages between Gigabit and PROFINET interface regulated by IP access list
- *WEB server;*
up to 30 MB of freely definable HTML pages can be called up via a standard browser;
data handling of own file system via FTP
- *Standard diagnostics pages;*
for quick diagnostics on the system for all of the modules plugged into the rack, without additional tools
- *E-mails;*
sending of e-mails with authentication directly from the user program. The e-mail client function allows user alerting directly from the control program
- *Communication via FTP;*
open protocol which is available on most operating system platforms
- The 32 MB RAM file system can be used for the buffer storage of dynamic data. In addition, there is a buffered 512 KB area, which is supplied via the central back-up battery

Diagnostics

Comprehensive diagnostics are made available via STEP 7, the web or SNMP, among others:

- General diagnostics and statistics functions
- Operating status of the CP
- Connection diagnostics
- Diagnostics of the assigned PROFINET field devices (also in the user program)
- LAN controller statistics
- Information about each port
- Diagnostic buffer
- Web diagnostics with simple diagnostics functions and diagnostics buffer of the CP and CPU in plain text

Diagnostic capabilities in operation

- Status query of connections via function blocks
- Integration into network management systems through the support of SNMP V1 MIB-II;
this allows the current status of the Ethernet interface to be called up.

Security

With a freely configurable access list, PCs and programmable controllers can be released in a targeted manner via TCP/IP for access to the CP or the controller. Web sites can be password protected.

Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the CP 443-1.

For creating PROFINET CBA components, the engineering tool SIMATIC iMap as of V 3.0 + SP1 is also required.

The configuring data of the CP created with STEP 7 is saved on the CPU. The storage volume of the S7 CPU must be observed, however.

The user-specific HTML pages, FTP data and interconnection information created with SIMATIC iMAP are saved on the swap medium C-PLUG (configuration plug).

The CP can be swapped in the event of failure without a programming device, because the relevant user and configuration data is saved on the CPU or on the C-PLUG.

The function blocks required for communication are included in the delivery kit of STEP 7 or can be downloaded from the Internet.

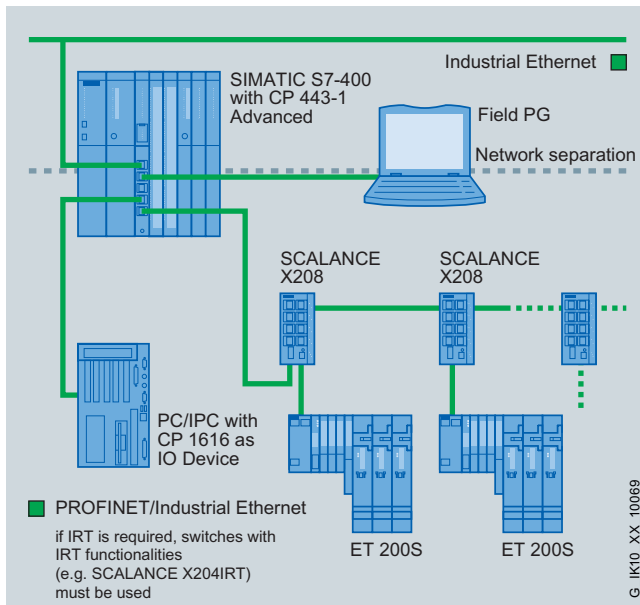
PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

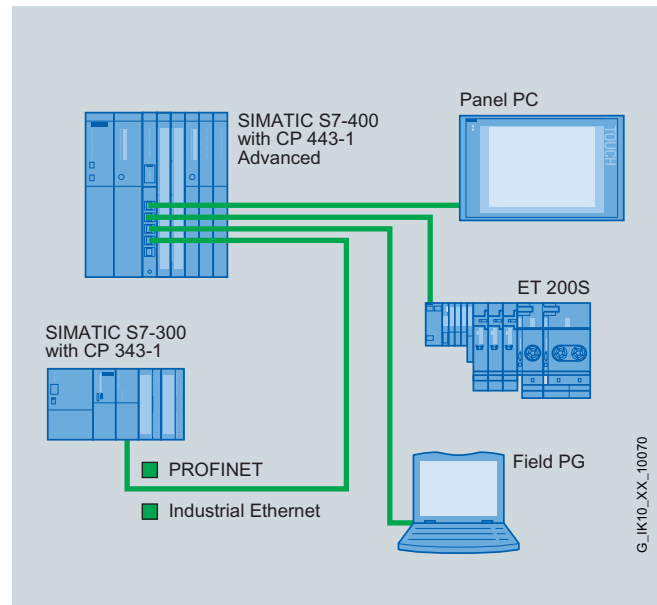
CP 443-1 Advanced

Integration

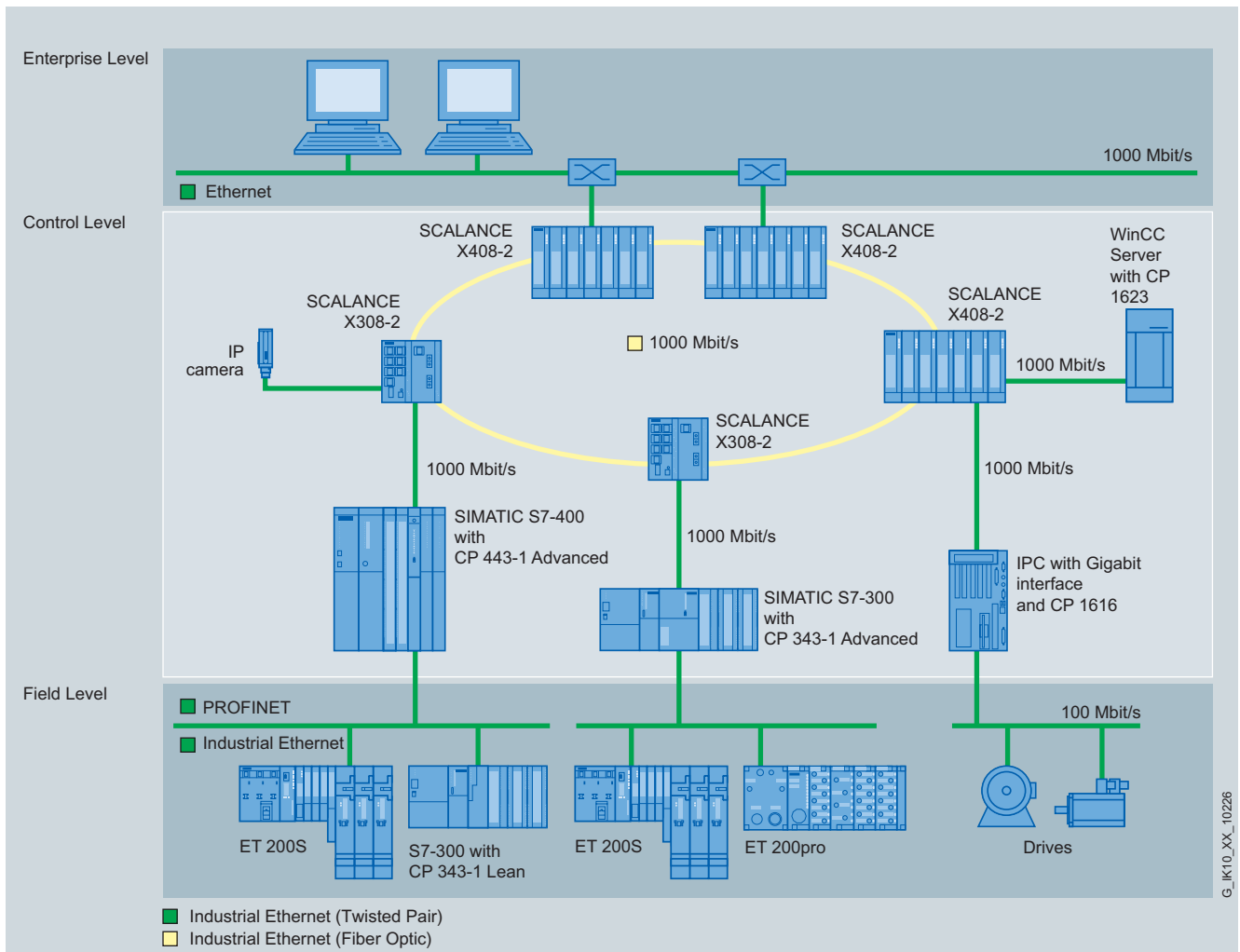
2



Connection to higher-level network



Small independent local networks (e.g. within a machine or cell)



Gigabit communication at the control level

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1 Advanced

Technical specifications

Order No.	6GK7 443-1GX20-0XE0
Product type description	CP 443-1 Advanced
Transfer rate	
Transmission rate at Interface 1	
• Minimum	10 Mbit/s
• Maximum	1000 Mbit/s
Transmission rate at Interface 2	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Electrical connection version	
• at Industrial Ethernet interface 1	1 x RJ45 (TP)
• at Industrial Ethernet interface 2	4 x RJ45 (TP)
Slot version of the swap medium	C-PLUG
Supply voltage	
Type of supply voltage	DC
Supply voltage	5 V
Relative symmetrical tolerance at 5 V DC	5%
Current consumption	
Current consumed from backplane bus at 5 V DC, typical	1,34 A
Effective power loss	
Effective power loss	7.25 W
Permitted ambient conditions	
Ambient temperature	
• during operation	0 ... +60 °C
• during storage	-40 ... +70 °C
• during transport	-40 ... +70 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	S7-400 compact module, single width
• Width	25 mm
• Height	290 mm
• Depth	217 mm
Net weight	750 g

¹⁾ also S5-compatible communication

²⁾ depending on the CPU type

Order No.	6GK7 443-1GX20-0XE0
Product type description	CP 443-1 Advanced
Performance data	
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE blocks, max. ¹⁾	64 ²⁾
Data volume as useful data for open communication by means of SEND/RECEIVE blocks	
• per ISO connection, max.	8 KB
• per ISO on TCP connection, max.	8 KB
• per TCP connection, max.	8 KB
• per UDP connection, max.	2 KB
• for each e-mail connection, max.	2 KB
Number of possible connections for open communication by means of T blocks, max.	64 ²⁾
Data volume as useful data for open comm. by means of T-blocks	
• per ISO on TCP connection, max.	1 452 bytes
S7 communication	
Number of possible connections for S7 communication	
• Maximum	128
• for PG connections, maximum	2
• for OP connections, maximum	30
Multi-protocol operation	
Number of active connections in multi-protocol operation	128
IT functions	
Number of possible connections	
• as client by means of FTP, max.	20
• as server	
- by means of FTP, max.	10
- by means of HTTP, max.	4
Memory capacity of the user memory	
• as Flash memory file system	30 MB
• as RAM	16 MB
• additionally buffered as RAM via central backup battery	512 KB

2

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1 Advanced

Technical specifications (continued)

Order No.	6GK7 443-1GX20-0XE0
Product type description	CP 443-1 Advanced
Performance data, PROFINET communication as PN IO controller	
Number of PN IO devices operable on PROFINET IO controller	128
• of which, PN IO IRT devices	32
Number of external PN IO lines with PROFINET per subrack	4
Data volume	
• as useful data for input variables as PROFINET IO controller	4 KB
• as useful data for output variables as PROFINET IO controller	4 KB
• as useful data for input variables per PN IO device as PROFINET IO controller	240 bytes
• as useful data for output variables per PN IO device as PROFINET IO controller	240 bytes
Performance data PROFINET CBA	
Number of remote interconnection partners in the case of PROFINET CBA	64
Total number of interconnections in the case of PROFINET CBA	600
Data volume	
• as useful data for digital inputs in the case of PROFINET CBA, max.	8 192 bytes
• as useful data for digital outputs in the case of PROFINET CBA, max.	8 192 bytes
• as useful data for arrays and data types	
- in case of acyclic transmission with PROFINET CBA, max.	8 192 bytes
- in case of cyclic transmission with PROFINET CBA, max.	250 bytes
- in case of local interconnection with PROFINET CBA, max.	2 400 bytes
Performance data PROFINET CBA, remote interconnections with acyclic transmission	
Send cycle of the remote interconnections in the case of acyclic transmission with PROFINET CBA	100 ms
Number of remote interconnections	
• with input variables in case of acyclic transmission with PROFINET CBA, max.	150
• with output variables in case of acyclic transmission with PROFINET CBA, max.	150
Data volume	
• as useful data for remote interconnections with input variables in the case of acyclic transmission with PROFINET CBA	81 92 bytes
• as useful data for remote interconnections with output variables in the case of acyclic transmission with PROFINET CBA	8 192 bytes

Order No.	6GK7 443-1GX20-0XE0
Product type description	CP 443-1 Advanced
Performance data PROFINET CBA, remote interconnections with cyclic transmission	
Send cycle of the remote interconnections in the case of cyclic transmission with PROFINET CBA	10 ms
Number of remote interconnections	
• with input variables in case of cyclic transmission with PROFINET CBA, max.	250
• with output variables in case of cyclic transmission with PROFINET CBA, max.	250
Data volume	
• as useful data for remote interconnections with input variables in the case of cyclic transmission with PROFINET CBA, max.	2 000 bytes
• as useful data for remote interconnections with output variables in the case of cyclic transmission with PROFINET CBA, max.	2 000 bytes
Performance data PROFINET CBA, HMI variables via PROFINET (acyclic)	
Number of HMI stations with login capability for HMI variables in the case of acyclic transmission with PROFINET CBA	3
Send cycle of the HMI variables in the case of acyclic transmission with PROFINET CBA	500 ms
Send cycle of the HMI variables in the case of acyclic transmission with PROFINET CBA max.	200
Data volume as useful data for HMI variables in the case of acyclic transmission with PROFINET CBA max.	8 192 bytes
Performance data PROFINET CBA, device-internal interconnections	
Number of interconnections in the case of PROFINET CBA, max	300
Data volume of internal interconnections in the case of PROFINET CBA, max	2 400 bytes
Performance data PROFINET CBA, interconnections with constants	
Number of interconnections with constants in the case of PROFINET CBA, max	500
Data volume as useful data for interconnections with constants in the case of PROFINET CBA, max	4 000 bytes
Performance data PROFINET CBA, PROFIBUS proxy functionality	
Product function in the case of PROFINET CBA, PROFIBUS proxy functionality	No
Number of accesses to S7-extended variables in case of PROFINET CBA max.	32
Configuration	
Configuration software for full functional scope STEP 7 V5.4 SP4 or higher	Yes

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1 Advanced

Ordering data	Order No.	Order No.
CP 443-1 Advanced communications processor For the connection of SIMATIC S7-400 to Industrial Ethernet; PROFINET IO Controller with RT and IRT, MRP, PROFINET CBA; TCP/IP, ISO and UDP; S7 communication, open communication (SEND/RECEIVE) with FETCH/WRITE, with and without RFC 1006, diagnostic expansions, multicast, clock synchronization by means of SIMATIC procedure or NTP, access protection by means of IP access list, FTP client/server, HTTP server, HTML diagnostics, SNMP, DHCP, e-mail, data storage on C-PLUG; PROFINET connection: 4 x RJ45 (10/100 Mbit/s) via switch; Gigabit connection: 1 x RJ45 (10/100/1000 Mbit/s); with electronic manual on DVD <ul style="list-style-type: none"> For use with SIMATIC S7-400 CPU, V5.2 or higher; 	6GK7 443-1GX20-0XE0	SOFTNET-S7 Lean Edition 2007 for Industrial Ethernet up to 8 connections <ul style="list-style-type: none"> Single License for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade from V6.4 to 2007 edition Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition
C-PLUG Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot	6GK1 900-0AB00	S7-1613 2007 Edition Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English <ul style="list-style-type: none"> Single License for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade S7-1613 from V6.4 to S7-1613 2007 Edition Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 2007 Edition
SOFTNET Edition 2007 for Industrial Ethernet Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English SOFTNET-S7 Edition 2007 for Industrial Ethernet up to 64 connections <ul style="list-style-type: none"> Single License for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade from V6.4 to 2007 edition Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition 	6GK1 704-1CW70-3AA0 6GK1 704-1CW00-3AL0 6GK1 704-1CW00-3AE0 6GK1 704-1CW00-3AE1	6GK1 704-1LW70-3AA0 6GK1 704-1LW00-3AL0 6GK1 704-1LW00-3AE0 6GK1 704-1LW00-3AE1
		IE FC RJ45 Plug 180 RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPU with Industrial Ethernet interface <ul style="list-style-type: none"> 1 pack = 1 unit 1 pack = 10 units 1 pack = 50 units
		6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0

PROFINET/Industrial Ethernet

System interfacing for SIMATIC S7

CP 443-1 Advanced

2

Ordering data (continued)

IE FC RJ45 Plug 4 x 2

RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPUs/CPUs with Industrial Ethernet interface

- 1 pack = 1 unit
- 1 pack = 10 units
- 1 pack = 50 units

6GK1 901-1BB11-2AA0**6GK1 901-1BB11-2AB0****6GK1 901-1BB11-2AE0**

SCALANCE X204-2 Industrial Ethernet switch

with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports

6GK5 204-2BB10-2AA3

Industrial Ethernet Switch SCALANCE X308-2

2 x 1000 Mbit/s multimode fiber-optic ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cables (multimode) up to a max. 750 m.

6GK5 308-2FL00-2AA3

STEP 7 Version 5.4

Target system:

SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC

Requirement:

Windows 2000 Prof./XP Prof.

Delivery package:

German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation

- Floating license on CD
- Rental license for 50 hours
- Software Update Service on CD (requires current software version)
- Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD
- Trial License STEP 7 V5.4; on CD, runs for 14 days

6ES7 810-4CC08-0YA5**6ES7 810-4CC08-0YA6****6ES7 810-4BC01-0YX2****6ES7 810-4CC08-0YE5****6ES7 810-4CC08-0YA7**

SIMATIC iMap V3.0

for configuring PROFINET CBA,

Requirement:

Windows 2000 Prof. with Service Pack 4 or later or Windows XP Prof. with Service Pack 1 or later or Windows 2003 Server with Service Pack 1 or later; on PG or PC with Pentium processor, min. 1 GHz; STEP 7 V5.3 or later with Service Pack 3, PN OPC Server V6.3 or later


Type of supply:






German, English, with electronic documentation

- Single License
- Software Update Service
- Upgrade to V3.0, Single License

6ES7 820-0CC04-0YA5**6ES7 820-0CC01-0YX2****6ES7 820-0CC04-0YE5**

Overview



Software	Hardware
<p>► You will find software products on the SIMATIC NET/Windows CD.</p> <p>► Development Kits are available for use in various operating system environments (e.g. for CP 1616 or CP 1604).</p> <p>► As a rule, the necessary configuration tools are included in the software packages.</p> <p>► Manuals in PDF format and extensive supplementary information on SIMATIC NET products and communication can be found in the SIMATIC NET Manual Collection which is enclosed with the software products.</p> <div> <p>SIMATIC NET Manual Collection</p>  </div>	<p>CPs with an internal microprocessor</p> <div> <p>CP 1613 A2 (PCI)</p>  </div> <div> <p>CP 1623 (PCIe)</p>  </div> <div> <p>CP 1616 (PCI)</p>  </div> <div> <p>CP 1604 (PC/104-Plus)</p>  </div>

G_JK10_xx_50183

CPs with an internal microprocessor

- Protocol software executes on the CP
- Free PC resources for applications
- Suitable for comprehensive applications
- Recommended for applications with HMI systems with high performance requirements, e.g. WinCC
- Recommended for large systems (eight stations or more, e.g. SIMATIC)
- Constant communication throughput
- Can be used for redundant communication
- Use for PROFINET IO real-time applications (RT, IRT with CP 1616/CP 1604)
- Time synchronization

CPs without an internal microprocessor

- Protocol software executes on the PG/PC
- PC resources are divided between communications and applications
- Suitable for less comprehensive applications
- Recommended for smaller applications (up to eight stations, e.g. SIMATIC)
- Communications performance depends on PC resources and PC loading

PROFINET/Industrial Ethernet

System interfacing for PG/PC

Performance data

Overview

The following communications processors are available for connecting to the programming device or PC:

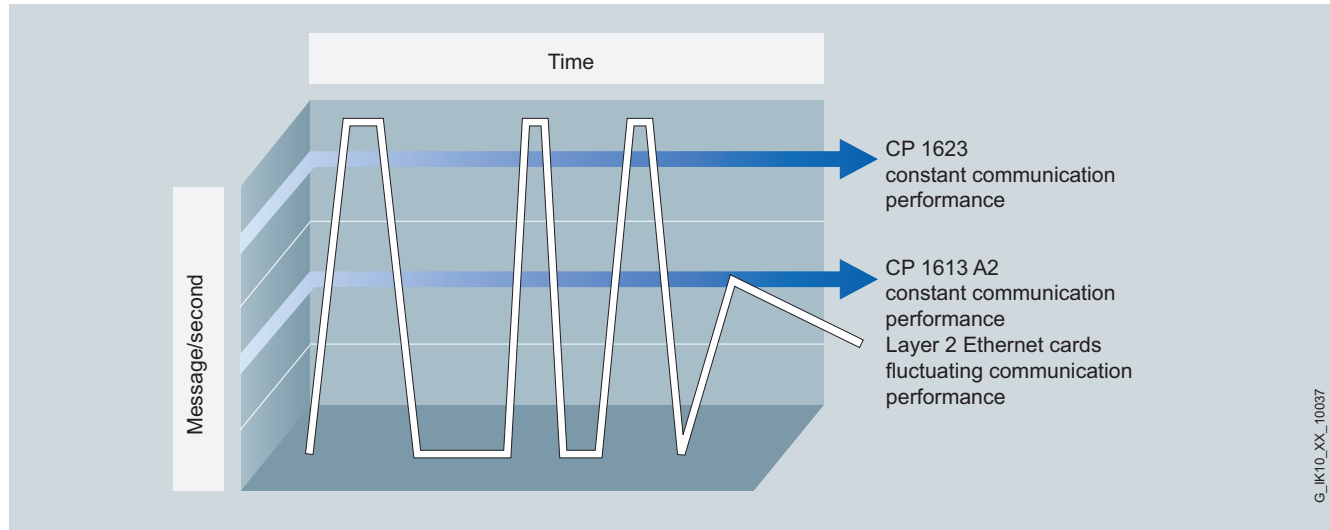
- CPs with an internal microprocessor:
 - CP 1616 (PCI)
 - CP 1604 (PC/104-Plus)
 - CP 1613 A2 (PCI)
 - CP 1623 (PCIe)

Data throughput of Industrial Ethernet

Comparisons between Layer-2 Ethernet cards and CP 1613 A2/CP 1623 show the respective communications throughput.

This throughput varies between 0 and the maximum throughput for Layer-2 Ethernet cards with the corresponding software packages.

When the CP 1613 A2/CP 1623 is used with software packages, the communications performance remains constantly at a high level and ensures fast response times without any variations.



Communication performance comparisons

Advanced PC Configuration

- Enables simple configuration of an OPC server
- Easy to handle thanks to automatic software installation (plug & play)
- Advanced PC configuration is included in the scope of supply of the communications software for the PC from Version 6.0 upwards; the configuration tool NCM PC as well as the configuration console are also supplied with it.

NCM PC

The PC can be configured either in STEP 7 or in NCM PC Version V5.1+SP2 and higher. Both tools offer the same look and feel and create the same database. This enables integrated configuring for the communication functions open communication and S7 communication. Data only has to be entered once and data consistency is assured.

- A configuration wizard integrated into NCM PC also supports user-driven configuration of the PC station.
- With NCM PC and STEP 7 from Version V5.1+SP2 upwards, a PC similar to a SIMATIC S7 station can be configured and loaded over a network. This applies both to the local station on which NCM PC or STEP 7 is installed and to the remote station that is addressed over the network.

Note:

NCM PC does not contain a conversion function for LDBs that were created using COM1 S7. Reconfiguration is necessary.

More information

Additional information can be found in the Internet under:
<http://www.siemens.com/simatic-net/ik-info>

G_IK10_XX_10037

PROFINET/Industrial Ethernet










System interfacing for PG/PC

Connection capabilities to SIMATIC PCs

Overview

The operating systems listed in the table refer exclusively to the communication products specified! Please refer to the descrip-

tion of the relevant IPC for the operating system that is available and has been released for that IPC.

													Embedded Systems				
Communication hardware	Communication software	Operating system environment of the communication software					SIMATIC Industrial PC/ Field PG						Op. sys.	SIMATIC Industrial PCs			
		Windows XP Pro + SP1/2	Windows Server 2003 + SP1/2	Windows Server 2003 R2 / SP2	Vista Business / Ultimate	other operating systems	Field PG M	Rack PC 847B	Rack PC 547B, Panel PC 577B	Box PC 627B	Box PC 827B	Microbox 427B	Windows XP Embedded + SP1/SP2/FP 2007	Microbox 427B	Panel PC 477, 477B	Panel PC 677B	Box PC 627B
CPs and software for Industrial Ethernet																	
CP 1613 A2 (PCI 32 Bit)	S7-1613 	●	●	●	●	—	—	● ⁶⁾	● ⁶⁾	● ^{8) 9)}	●	—	—	—	—	○ ⁹⁾	●
	S7-REDCONNECT ⁶⁾ 	●	●	●	●	—	—	○ ⁶⁾	○ ⁶⁾	○ ^{8) 9)}	●	—	—	—	—	○ ^{7) 9)}	○ ^{8) 9)}
CP 1623 (PCIe x1)	S7-1613 	●	●	●	●	—	—	○ ⁹⁾	●	○ ⁹⁾	○ ⁹⁾	—	—	—	—	○ ⁹⁾	○ ⁹⁾
	S7-REDCONNECT ⁶⁾ 	●	●	●	●	—	—	○ ^{6) 9)}	○ ⁶⁾	○ ^{8) 9)}	○ ⁹⁾	—	—	—	—	○ ^{8) 9)}	○ ^{8) 9)}
SIMATIC PG/PC with integral Ethernet interface	SOFTNET-S7 	●	●	●	●	—	●	●	●	●	●	●	●	●	●	●	●
	SOFTNET-S7 Lean 	●	●	●	●	—	●	●	●	●	●	●	●	●	●	●	●
	SOFTNET-PG 	●	●	●	●	—	●	●	●	●	●	●	●	●	●	●	●
CPs and software for PROFINET																	
CP 1616 ¹⁾ (PCI 32 Bit)	DK-16xx PN IO ¹⁾ V2.1	●	○	○	○	○	—	○	○	○	○	—	○	—	—	○	○
CP 1604 1) (PC/104-Plus)	DK-16xx PN IO ¹⁾ V2.1	●	○	○	○	○	—	—	—	—	—	○ ⁴⁾	○	○ ⁴⁾	○ ⁴⁾	—	—
SIMATIC PG/PC with integral Ethernet interface	SOFTNET PN IO 	●	—	—	—	—	●	●	●	○	○	○ ⁴⁾	●	● ⁴⁾	● ⁴⁾	●	●
	PN CBA OPC-Server 	●	●	●	●	—	●	●	●	○	○	○ ⁴⁾	—	—	—	—	—

- 1) Use of these CPs requires porting of the Development Kit DK-16xx PN IO to the relevant operating system environment. You can order the DK-16xx PN IO at www.siemens.com/simatic-net/dk16xx on the Internet. It contains sample software for Linux Suse 10 and Windows XP Professional. For IRT operation an exclusive interrupt is necessary; this is not available in all slots. The additional use of CP 1616/CP 1604 is not approved for SIMATIC Industrial PC versions and integrated PROFINET interface.
- 2) Use of these CPs in other operating system environments requires porting of the Development Kit DK-5613 to the relevant operating system environment. You can order the DK-5613 on the Internet at www.siemens.com/simatic-net/dk5613.
- 3) Integrated PROFIBUS interface is optional
- 4) possible with restrictions, if necessary, depending on memory expansion and processor capacity.
- 5) Integrated PROFIBUS interface is optional in some cases
- 6) requires at least 2 PCI or 2 PCIe slots (4-way redundancy requires 4 free PCI or 4 PCIe slots!); hybrid configurations with CP 1613 A2 (PCI) and CP 1623 (PCIe) are possible, depending on PC expansion
- 7) not possible for 677B in version with 1x PCI or 1x PCIe slot
- 8) without 4-way redundancy as there are only 2 slots
- 9) depending on the slots of the selected PC version

Notes

- Please always note the supplementary conditions for the specified SIMATIC NET products that you can view on the Internet pages shown below.
- for further details on XP embedded, see <http://support.automation.siemens.com/WWW/view/de/21661049>
- further details on system requirements and operating environments can be found in the Readme file of the communication products on the SIMATIC NET PC Software CD, 2007 Edition or at <http://support.automation.siemens.com/WWW/view/de/26610954>
- Updates and supplements to the catalog entries, as well as the above tables can be viewed at <http://www.siemens.com/simatic-net/ik-info>

- suitable
- not suitable
- suitable under certain conditions

on SIMATIC NET CD 2007 Edition

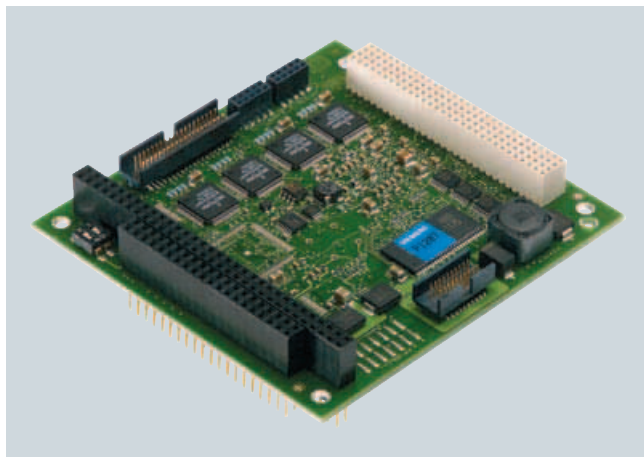
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PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1604

Overview



ISO	TCP/UDP	PN	MRP	OPC	PG/OP	S7/S5	IT
	●	●					

- PC/104 Plus module for connecting PC/104 Plus systems to PROFINET IO
- Full/half duplex with autonegotiation
- With Ethernet real-time ASIC ERTEC 400
- Integral 4-port real-time switch
- Communication services:
 - PROFINET IO controller and/or PROFINET IO device
 - Support of IRT in motion control applications
- High performance through direct memory access
- Integration in network management systems through the support of SNMP
- Comprehensive diagnostics possibilities for installation, start-up and operation of the module
- Powerful configuration tools are included in delivery of module

Benefits



- Connection of field devices to Industrial Ethernet with PROFINET
- Ideally suited for design of small local networks through integral 4-port real-time switch
- Direct memory access to process data by linking as PROFINET IO-Controller via IO-Base interface
- High computing power is available in the PC by taking the load off the host CPU by means of a real-time ASIC ERTEC 400 with support of the PROFINET real-time features RT and IRT
- Implementation in Motion Control applications thanks to support of IRT
- Simple transfer to various operating system environments using Development Kit DK-16xx PN IO
- Switch mode also with the PC switched off, via optional external power supply (in RT mode only)
- Uncrossed connecting cables can be used due to the integrated Autocrossover function

Application

The CP 1604 is used to connect PC/104 Plus systems to PROFINET IO.

The CP 1604 provides high-performance support for control tasks on the PC (PC based Control, Numeric Control, Robot Control).

With IRT (Isochronous Real-Time), the CP is ideally suited to time-critical applications that are in the range of strictly isochronous closed-loop control in the motion control sector.

The integrated 4-port switch supports low-cost system solutions and the configuration of different topologies.

The CP 1604 offers PC/104 Plus systems communications facilities with:

- PROFINET IO controller and/or PROFINET IO device

The DK-16xx PN IO development kit enables integration of the module into any operating systems.

Design

- Industrial Ethernet (via "Connection Board for CP 1604")
 - Ethernet real-time ASIC ERTEC 400
 - 4 x RJ45 connection
 - Integral 4-port real-time switch for 10/100 Mbit/s Ethernet
 - Half/full duplex
 - Autosensing/Autocrossover/Autonegotiation
- PC/104 Plus port:
 - PCI 2.2
 - 32 bits
 - 33 MHz or 66 MHz
 - Installation through PCI standard mechanisms (Plug & Play)
- Host interface/processor:
 - Dual-port RAM onboard
 - Flash for program memory onboard
 - ARM 946 RISK processor (32-bit) onboard for preprocessing
- Power supply:
 - Operating voltage: 5 V through PC/104 Plus
 - Optional external 24 V DC supply for switch operation when PC is switched off (through "Power Supply for CP 1604")
- Size:
 - PC/104 Plus format

Function

The CP 1604 can be operated as a PROFINET IO controller and/or PROFINET IO device that stores the process image (input and output data) in the memory area on the CP. With simultaneous controller and device mode, only the controller or the device can be operated in IRT mode. High-performance data transfer to and from the IO devices is performed autonomously by the CP 1604.

Real-time

Support of real-time properties of PROFINET for RT and IRT. The real-time properties of the CP 1604 ensure extremely short cycle times with highly accurate clock-pulse rates.

Switching

According to the industry requirements, the 4-port real-time switch additionally permits the configuration of line topologies with spur lines and makes external switch components unnecessary.

The switch function in RT mode is also available when the PC is turned off thanks to the possibility of independently supplying an external voltage (via "Power Supply for CP 1604").

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1604

Function (continued)

Software packages

DK-16xx PN IO development kit;

driver and IO-Base software for CP 1604 as PROFINET IO-Controller and IO-Device under Linux in source code for transfer to any PC-based operating systems with IO-Base interface for:

- PROFINET communication:
 - PROFINET IO controller:
 - Connection of field devices to Industrial Ethernet with PROFINET
 - PROFINET IO device:
 - Link-up with a PROFINET IO controller through real-time communication according to the PROFINET standard
- Access in isochronous mode to real-time data for PROFINET over IRT; extremely short cycle times with highly accurate clock-pulse rates; jitter accuracy, isochronous mode, and cycle time enable high-performance motion control applications.
- Direct memory access to the process data; the process data of the IO-Devices are always consistent. The IO programming interface provides the PC programmer with function calls for data transfer.
- The design of the interface not only permits fast access as PROFINET IO controller, but also easy porting to other operating system environments (e.g. VXWorks, QNX, RMOS, RTX).
- The IO-Base interface for the PROFINET IO controller of the CP 1604 is compatible with the interface for SOFTNET PN IO
- The CP 1604 is functionally compatible to the CP 1616

Using the Development Kit DK-16xx PN IO, the CP 1604 communications processor can be integrated into any PC-based operating system environment. The Development Kit contains the driver and IO-Base source code required for this including the transfer instructions and also the example code which executes with SUSE Linux 10.

User interfaces

Programming interface through C library

- For applications that want to use the PROFINET IO-Controller or IO-Device functionality directly over C/C++, the IO-Base interface can be used. This interface is of a similar design to the DP Base interface of PROFIBUS modules CP 5613 and CP 5614. It is therefore possible to port existing PROFIBUS DP master applications to PROFINET IO-Controller applications.

Diagnostics data

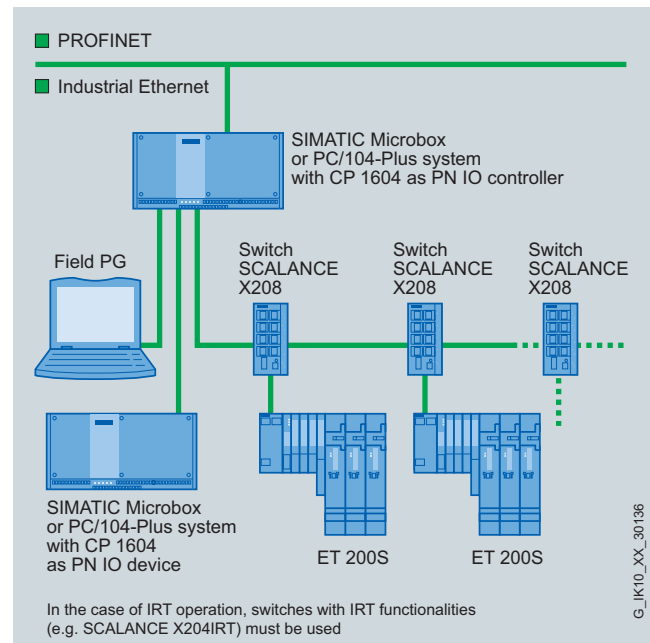
Extensive diagnostic options are available via STEP 7 or SNMP, including:

- General diagnostics functions
- Connection diagnostics
- Diagnostics of the assigned PROFINET field devices
- Integration in network management systems through the support of SNMP

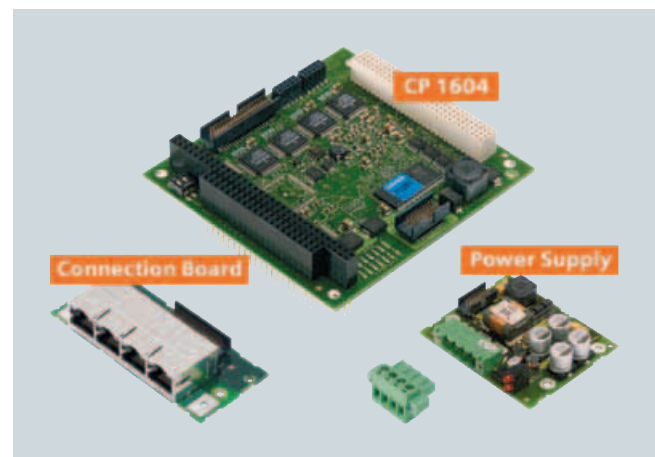
Configuration

Configuration of the CP 1604 is performed with STEP 7/NCM PC, V5.3 SP2 and higher. NCM PC is included with the module.

Integration



CP 1604 as PROFINET IO-Controller and PROFINET IO-Device



CP 1604 with accessories



CP 1604 Microbox Package

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1604

Technical specifications

Order No.	6GK1 160-4AA00
Product type description	CP 1604
Transfer rate	
Transmission rate for auto-sensing for Industrial Ethernet	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Electrical connection version	
• the Industrial Ethernet interface	4 x RJ45 TP; via connection board
• of the backplane bus	PC/104 Plus compatible, 32 bit, 33 MHz/66 MHz
• for voltage supply	Via Power Supply for CP 1604
Supply voltage	
Type of supply voltage	DC
Supply voltage	
• 1 from backplane bus	5 V
• external, max.	24 V
Relative symmetrical tolerance	
• at 5 V DC	5%
• at 24 V DC	20%
Current consumption	
Current consumed	
• 1 from backplane bus if DC, max.	800 mA
• from external supply voltage at 24 V DC max.	300 mA
Power loss	
Effective power loss	4 W
• in switch mode	
- Minimum	3.9 W
- Maximum	4.1 W
Permitted ambient conditions	
Ambient temperature	
• during operation	+5 ... +55 °C
• during transport	-20 ... +60 °C
• during storage	-20 ... +60 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	PC/104 Plus format
• Height	95 mm
• Width	90 mm
• Depth	24 mm
Net weight	110 g

Order No.	6GK1 160-4AA00
Product type description	CP 1604
Performance data	
PROFINET communication as PN IO controller	
Number of PN IO devices operable on PROFINET IO controller	128
• of which, PN IO IRT devices, max.	16
Data volume	
• as useful data for input variables as PROFINET IO controller	2 KB
• as useful data for output variables as PROFINET IO controller	2 KB
• as useful data for input variables per PN IO device as PROFINET IO controller	1433 bytes
• as useful data for output variables per PN IO device as PROFINET IO controller	1433 bytes
PROFINET communication as PN IO device	
Data volume	
• as useful data for input variables as PROFINET IO device	1433 bytes
• as useful data for output variables as PROFINET IO device	1433 bytes

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1604

Ordering data	Order No.	Order No.
CP 1604 communications processor PCI/104 Plus Card (32 bit) with ASIC ERTEC 400 for connecting PC/104 Plus systems to PROFINET IO with 4-Port-Real-Time-Switch (RJ45); ; incl. IO Base Software for PROFINET IO Controller and NCM PC; single license for one installation, runtime software, software and electronic manual on CD-ROM, Class A, for 32 Bit Windows XP Professional; other operating systems by means of Development Kit DK-16xx PN IO German/English	6GK1 160-4AA00	Accessories Connection board for CP 1604 Connection board for CP 1604 with four RJ45 sockets incl. connecting cable Power supply for CP 1604 Redundant power supply for CP 1604 for operating the integral 4-port switch of the CP 1604 with the PC/104 system switched off; includes connecting cable DK-16xx PN IO V2.1 development kit Software development kit for CP 1616/CP 1604; driver and IO-Base software for CP 1616/CP 1604 as PN IO controller and IO device in source code for transfer to other PC-based operating systems; including executable example code for SUSE Linux 9.3 and Windows XP Professional IE FC RJ45 Plug 180 RJ45 plug-in connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface • 1 pack = 1 unit • 1 pack = 10 units • 1 pack = 50 units SCALANCE X204-2 with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports SCALANCE X204IRT 4 x 10/100 Mbit/s RJ45 Ports IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m IE FC TP Flexible Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m
CP 1604 Microbox Package Package for implementing the CP 1604 in the SIMATIC Microbox PC; comprising the CP 1604, connection board, power supply and expansion racks for Microbox PC; for use with Development Kit DK-16xx PN IO; NCM PC	6GK1 160-4AU00	6GK1 160-4AC00 6GK1 160-4AP00 see http://www.siemens.com/simatic-net/dk16xx 6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0 6GK5 204-2BB10-2AA3 6GK5 204-0BA00-2BA3 6XV1 840-4AH10 6XV1 870-2B

2

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1616

Overview



ISO	TCP/ UDP	PN	MRP	OPC	PG/OP	S7/S5	IT
	●	●					

- PCI module for connecting PCs and SIMATIC PGs/PCs to PROFINET IO (Universal Keyed 3.3 V and 5 V; 33 MHz/66 MHz; 32-bit, runs in 64-bit PCI-X systems)
- Full/half duplex with autonegotiation
- With Ethernet real-time ASIC ERTEC 400
- Integral 4-port real-time switch
- Communication services:
 - PROFINET IO controller and/or PROFINET IO device
 - Support of IRT in motion control applications
- High performance through direct memory access
- Integration in network management systems through the support of SNMP
- Comprehensive diagnostics possibilities for installation, start-up and operation of the module
- Powerful configuration tools are part of the scope of delivery of the module

Benefits



- Connection of field devices to Industrial Ethernet with PROFINET
- Ideally suited for design of small local networks through integral 4-port real-time switch
- Direct memory access to process data by linking as PROFINET IO-Controller via IO-Base interface
- High computing power is available in the PC by taking the load off the host CPU by means of a real-time ASIC ERTEC 400 with support of the PROFINET real-time features RT and IRT
- Implementation in Motion Control applications thanks to support of IRT
- Simple transfer to various operating system environments using Development Kit DK-16xx PN IO
- Switch mode also with the PC switched off, via optional external power supply (in RT mode only)
- Uncrossed connecting cables can be used due to the integrated Autocrossover function

Application

The CP 1616 enables SIMATIC PGs/PCs and PCs equipped with a PCI slot to be connected to PROFINET IO.

The CP 1616 provides high-performance support for control tasks on the PC (PC-based control, numeric control, robot control).

With IRT (isochronous real-time), the CP is ideally suited to time-critical applications that are in the range of isochronous closed-loop control in the motion control sector.

The integrated 4-port switch supports low-cost system solutions and the configuration of different topologies.

The CP 1616 provides SIMATIC programming devices/PCs and industrial PCs with communication functions as:

- PROFINET IO controller and/or PROFINET IO device

The DK-16xx PN IO development kit enables integration of the module into any operating systems.

Design

- Industrial Ethernet
 - Ethernet real-time ASIC ERTEC 400
 - 4 x RJ45 connection
 - Integral 4-port real-time switch for 10/100 Mbit/s Ethernet
 - Half/full duplex
 - Autosensing/Autonegotiation/Autonegotiation
- PCI interface:
 - PCI 2.2
 - 32-bit, for execution in 64-bit PCI X systems
 - 33 MHz or 66 MHz
 - Universal Keyed 3.3 V and 5 V
 - Installation through PCI standard mechanisms (Plug & Play)
- Host interface/processor:
 - Dual-port RAM on board
 - Flash for program memory onboard
 - ARM 946 RISK processor (32-bit) onboard for preprocessing
- Power supply:
 - Operating voltage: 5 V through PCI
 - Optional external 6 to 9 V DC supply for switch operation with PC switched off
- Size:
 - Short PCI format

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1616

Function

The CP 1616 can be operated as a PROFINET IO controller and/or PROFINET IO device that stores the process image (input and output data) in the memory area on the CP. With simultaneous controller and device mode, only the controller or the device can be operated in IRT mode. High-performance data transfer to and from the IO devices is performed autonomously by the CP 1616.

Real-time

Support of real-time properties of PROFINET for RT and IRT. The real-time properties of the CP 1616 ensure extremely short cycle times with highly accurate clock-pulse rates.

Switching

According to the industry requirements, the 4-port real-time switch additionally permits the configuration of line topologies with spur lines and makes external switch components unnecessary.

The switch function is also available in RT mode when the PC is turned off thanks to the possibility of independently supplying an external voltage.

Software packages

DK-16xx PN IO development kit;
driver and IO-Base software for CP 1616 as PROFINET IO-Controller and IO-Device under Linux in source code for transfer to any PC-based operating systems with IO-Base interface for:

- PROFINET communication:
 - PROFINET IO controller:
Connection of field devices to Industrial Ethernet with PROFINET
 - PROFINET IO device:
Link-up with a PROFINET IO controller through real-time communication according to the PROFINET standard
- Access in isochronous mode to real-time data for PROFINET over IRT; extremely short cycle times with highly accurate clock-pulse rates; jitter accuracy, isochronous mode, and cycle time enable high-performance motion control applications.
- Direct memory access to the process data; the process data of the IO-Devices are always consistent. The IO programming interface provides the PC programmer with function calls for data transfer.
- The design of the interface not only permits fast access as PROFINET IO controller, but also easy porting to other operating system environments (e.g. VXWorks, QNX, RMOS, RTX).
- The IO-Base interface for the PROFINET IO controller of the CP 1616 is compatible with the interface for SOFTNET PN IO
- The CP 1616 is functionally compatible with the CP 1604

Using the Development Kit DK-16xx PN IO, the CP 1616 communications processor can be integrated into any PC-based operating system environments. The development kit contains the driver and IO-Base source code required for this including the transfer instructions, and also the example code which executes with SUSE Linux 10.

User interfaces

Programming interface through C library

For applications that want to use the PROFINET IO-Controller or IO-Device functionality directly over C/C++, the IO-Base interface can be used. This interface is of a similar design to the DP Base interface of PROFIBUS modules CP 5613 and CP 5614. It is therefore possible to port existing PROFIBUS DP master applications to PROFINET IO-Controller applications.

Diagnostics

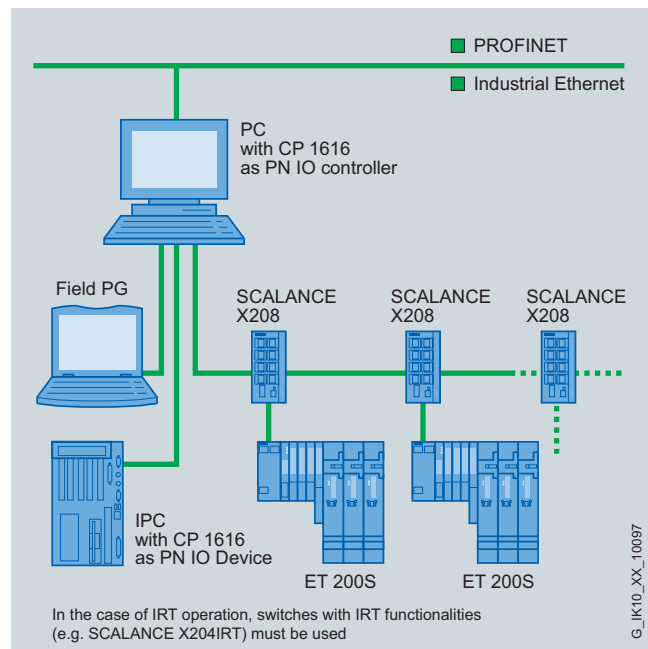
Extensive diagnostic options are available via STEP 7 or SNMP, including:

- General diagnostics functions
- Connection diagnostics
- Diagnostics of the assigned PROFINET field devices
- Integration in network management systems through the support of SNMP

Configuration

Configuration of the CP 1616 is performed with STEP 7/NCM PC, V5.3 SP2 and higher. NCM PC is included with the module.

Integration



CP 1616 as PROFINET IO-Controller and PROFINET IO-Device

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1616

Technical specifications

Order No.	6GK1 161-6AA00
Product type description	CP 1616
Transfer rate	
Transmission rate for auto-sensing for Industrial Ethernet	
• Minimum	10 Mbit/s
• Maximum	100 Mbit/s
Interfaces	
Electrical connection version	
• the Industrial Ethernet interface	4 x RJ45 (TP)
• of the backplane bus	PCI (32 Bit, 3.3 V/5 V; Universal Keyed; 33/66 MHz)
• for voltage supply	Low-voltage socket for hollow plug 3.5 mm (-) / 1.3 mm (+)
Supply voltage	
Type of supply voltage	DC
Supply voltage	
• 1 from backplane bus	5 V
• external	
- Minimum	6 V
- Maximum	9 V
Relative symmetrical tolerance at 5 V DC	5%
Current consumption	
Current consumed	
• 1 from backplane bus if DC, max.	800 mA
• from external supply voltage	
- at 6 V DC, max.	650 mA
- at 9 V DC, max.	450 mA
Power loss	
Effective power loss	4 W
• in switch mode	
- Minimum	3.9 W
- Maximum	4.1 W

Order No.	6GK1 161-6AA00
Product type description	CP 1616
Permitted ambient conditions	
Ambient temperature	
• during operation	+5 ... +55 °C
• during transport	-20 ... +60 °C
• during storage	-20 ... +60 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	PCI card, short
• Height	167 mm
• Width	107 mm
Net weight	110 g
Performance data	
PROFINET communication as PN IO controller	
Number of PN IO devices operable as PROFINET IO devices	128
• of which, PN IO IRT devices	16
Data volume	
• as useful data for input variables as PROFINET IO controller	2 KB
• as useful data for output variables as PROFINET IO controller	2 KB
• as useful data for input variables per PN IO device as PROFINET IO controller	1433 bytes
• as useful data for output variables per PN IO device as PROFINET IO controller	1433 bytes
PROFINET communication as PN IO device	
Data volume	
• as useful data for input variables as PROFINET IO device	1433 bytes
• as useful data for output variables as PROFINET IO device	1433 bytes

Ordering data	Order No.	Order No.
CP 1616 communications processor PCI Card (32 Bit; 3.3/5 V universal keyed) with ASIC ERTEC 400 for connecting PCs to PROFINET IO with 4-Port-Real-Time-Switch (RJ45); incl. IO Base Software for PROFINET IO Controller and NCM PC; single license for one installation, runtime software, software and electronic manual on CD-ROM, Class A, for 32 Bit Windows XP Professional; other operating systems via Development Kit DK-16xx PN IO German/English	6GK1 161-6AA00	Accessories DK-16xx PN IO V2.1 development kit Software development kit for CP 1616/CP 1604; driver and IO-Base software for CP 1616/CP 1604 as PN IO controller and IO device in source code for transfer to other PC-based operating systems; including executable example code for SUSE Linux 10 and Windows XP Professional IE FC RJ45 Plug 180 RJ45 plug-in connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface <ul style="list-style-type: none">• 1 pack = 1 unit• 1 pack = 10 units• 1 pack = 50 units IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m IE FC TP Flexible Cable GP 2 x 2 (Type B) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 Plug for occasional movement; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m, minimum order 20 m
		see http://www.siemens.com/simatic-net/dk16xx 6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0 6XV1 840-4AH10 6XV1 870-2B

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1613 A2

Overview



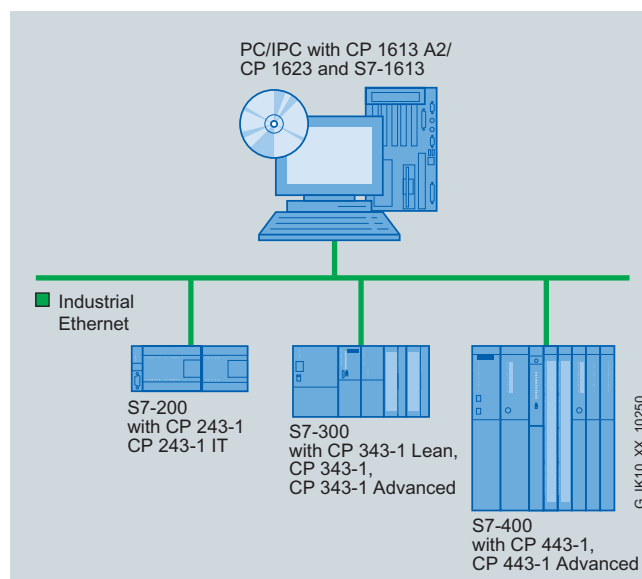
ISO	TCP/UDP	PN	MRP	OPC	PG/OP	S7/S5	IT
●	●			●	●	●	●

- PCI card (32 bit; 33 MHz/66 MHz; 3.3 V/5 V universal key) with microprocessor for connection of PG/PC to Industrial Ethernet with 10/100 Mbit/s Autosensing/Autonegotiation
- Communication services using
 - Open IE communication via TCP/IP and UDP)
 - ISO transport protocol
 - PG/OP communication
 - S7 communication
 - Open communication (SEND/RECEIVE)
- 15-pole ITP connection
- RJ45 connection
- Time synchronization
- ISO and TCP/IP transport protocol onboard
- SNMP-supported diagnostics
- The appropriate OPC server and configuration tools are included in the respective scope of supply of the communication software

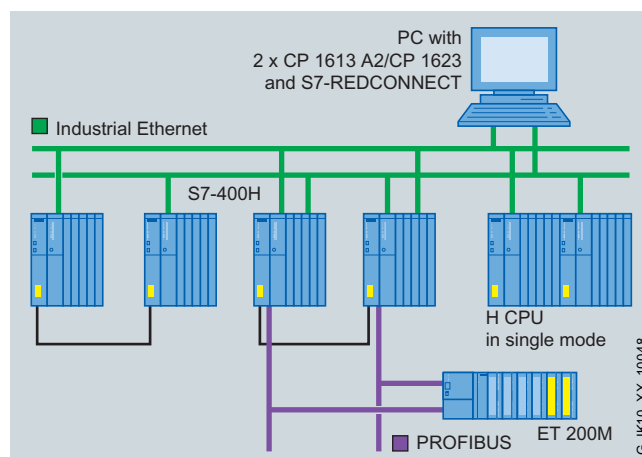
Benefits



- Constant data throughput through protocol processing on the CP
- Can be connected to many devices through ITP or RJ45 connections on the module
- Free computing capacity for other applications on the PC e.g. HMI (ISO and TCP/IP transport onboard)
- Simple handling through Plug&Play and Autosensing (10/100 Mbit/s)
- Operation of large network configurations with a single card through high number of connections
- Can be used for redundant communication
- OPC as standard interface
- Uniform procedure and configuration functions for NCM PC and STEP 7



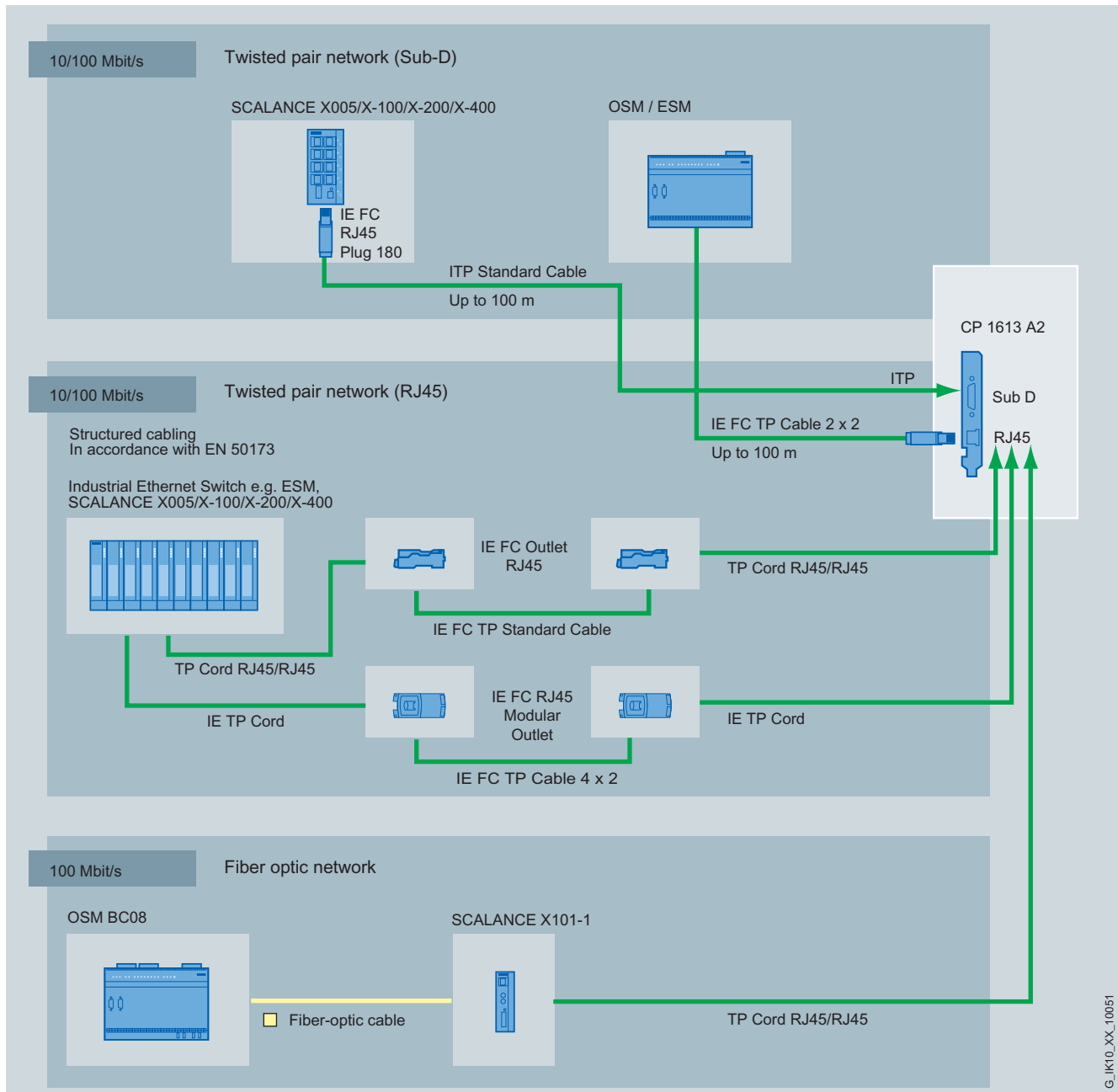
System configuration with CP 1613 A2/CP 1623 and S7-1613



Example of redundant network structure with CP 1613 A2/CP 1623 and S7-REDCONNECT

Application

The CP 1613 A2 is used to connect SIMATIC PGs/PCs and PCs with a PCI slot to Industrial Ethernet (10/100 Mbit/s).



Network connection facilities for CP 1613 A2

Design

The module CP 1613 A2 (PCI card with 32-bit microprocessor; 33 MHz/66 MHz; 3.3 V/5 V Universal Key) is inserted directly into a SIMATIC PG/PC or into a PC and requires a short PCI slot. It is capable of running in 64-bit PCI-X slots (PCI 2.2 and PCI-X-compatible).

Ports:

- 15-pin Sub-D socket for ITP
- RJ45 jack for twisted pair
- Automatic recognition and selection of the interface during booting (ITP or RJ45)

The module is connected, for example,

- in the case of ITP via the ITP standard cable 9/15 to OSM/ESM
- in the case of TP via TP cord up to 10 m or via FastConnect system up to 100 m (IE FC RJ45 Plug and FC cables) to SCALANCE X or SCALANCE S

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1613 A2

Function

User interfaces

OPC interface

As a standard programming interface for the S7 communication and open communication protocols, the OPC server contained in the respective software package can be used to connect the automation technology to OPC-compatible Windows applications (Office, HMI systems, etc.).

Programming interface through C library

The programming interfaces for the S7 communication, PG/OP communication, and open communication protocols for existing applications are implemented as Dynamic Link Library (DLL) interfaces.

You can find the released compilers in the Readme file of the SIMATIC NET CD products at <http://www.siemens.com/automation/csi/net>.

Software for PG/OP communication

This software supports the programming of SIMATIC S5 and S7 controllers over Industrial Ethernet in combination with STEP 5 / STEP 7 programmable controllers.

It is included in all CP 1613 A2 software packages.

Software for S7 communication (S7-1613 or S7-REDCONNECT)

The S7 interface provides PG/PC applications (e.g. WinCC) and application programs with access to SIMATIC S7 system components. This provides easy, flexible access to the data of the SIMATIC S7 controller.

S7 communication offers:

Administrative services

- Connection management
- Mini database
- Trace

Data transfer services

- Read/write variables
- BSEND/BRECEIVE

H-communication

For redundant S7-communication with a fault-tolerant S7-400 H system, the CP 1613/CP1623 can be used in connection with the S7-REDCONNECT software.

Software for open communication (SEND/RECEIVE)

This interface is used for communication between

- PG/PC and SIMATIC S5
- PG/PC and SIMATIC S7
- PG/PC and PG/PC

used

Open communication (SEND/RECEIVE) offers the following services:

- Management services
- Connection establishment services
- Data transfer services

The software is included in the S7-1613 product.

Mode of operation

Protocols up to Level 4 (Transport) are processed autonomously on the module.

16 MB of memory is available for this to support a large quantitative framework and reliable communication.

Data is exchanged between the module and the host in master mode. This means that the CP 1613 A2 accesses the physical RAM of the host.

A Windows driver is responsible for transferring data between the host system and the CP 1613 A2. The transmission rate to Industrial Ethernet is detected and automatically switched over (autosensing).

The IT functionality is provided in combination with the Windows software of the PC.

Diagnostics data

Via SNMP all MIB-2 objects can be read out. This enables the current status of the Ethernet interfaces to be retrieved.

Configuration

- The S7 communication and open communication protocols are configured in STEP 7 or NCM PC.
- The configuration tool NCM PC is included in the CP 1613 A2 software packages.
- NCM PC is a component part of Advanced PC Configuration.

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1613 A2

2

Technical specifications		Ordering data	Order No.
Order No.	6GK1 161-3AA01	CP 1613 A2 communications processor	6GK1 161-3AA01
Product type description	CP 1613 A2	PCI card (32-bit, 33 MHz/66 MHz; 3.3 V/5 V universal keyed) for connection to Industrial Ethernet (10/100 Mbit/s) with ITP and RJ45 connection over S7-1613 and S7-REDCONNECT, incl. drivers for 32-bit Windows XP Professional, 2003 Server, Windows 2000 Professional/Server	
Transfer rate Transmission rate for auto-sensing for Industrial Ethernet			
• Minimum	10 Mbit/s		
• Maximum	100 Mbit/s		
Interfaces Number of electrical connections for network components or terminal equipment with auto-crossover, auto-negotiation and auto-sensing Electrical connection version	1		
• the Industrial Ethernet interface	1 x 15-pin Sub-D socket (ITP)/RJ45(TP)		
• of the backplane bus	PCI (32-bit, 3.3V/5V; Universal Keyed; 33/66 MHz)		
Supply voltage Type of supply voltage	DC		
Supply voltage			
• 1 from backplane bus	5 V		
• 2 from backplane bus	12 V		
Relative symmetrical tolerance			
• at 5 V DC	5%		
• at 12 V DC	5%		
Current consumption Current consumed			
• 1 from backplane bus if DC, max.	600 mA		
• 2 from backplane bus if DC, max.	500 mA		
Power loss Effective power loss	4 W		
Permitted ambient conditions Ambient temperature			
• during operation	+5 ... +55 °C		
• during transport	-20 ... +60 °C		
• during storage	-20 ... +60 °C		
Maximum relative humidity at 25 °C during operation	95%		
Design, dimensions and weight Module format	PCI card		
• Height	167 mm		
• Width	107 mm		
Net weight	200 g		
Performance data Open communication Number of possible connections for open communication by means of SEND/RECEIVE, max. ¹⁾	120		
S7 communication Number of possible connections for S7/PG communication, max.	120		
Multi-protocol operation Number of active connections in multi-protocol operation	120		
Number of plug-in cards of the same type that can be plugged in for each PC station	4		
Number of all configurable connections for each PC station	207		
		S7-1613 2007 Edition Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English	
		• Single license for 1 installation	6GK1 716-1CB70-3AA0
		• Software Update Service for 1 year, with automatic extension; requirement: Current software version	6GK1 716-1CB00-3AL0
		• Upgrade S7-1613 from V6.4 to S7-1613 2007 Edition	6GK1 716-1CB00-3AE0
		• Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 2007 Edition	6GK1 716-1CB00-3AE1
		S7-REDCONNECT 2007 Edition Software for fail-safe S7 communication over redundant networks incl. S7-OPC server, S7-1613 2007, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English	
		• Single License for 1 installation	6GK1 716-0HB70-3AA0
		• Software Update Service for 1 year, with automatic extension; requirement: Current software version	6GK1 716-0HB00-3AL0
		• Upgrade S7-REDCONNECT from V6.4 to S7-REDCONNECT 2007 Edition	6GK1 716-0HB00-3AE0
		• Upgrade S7-REDCONNECT from V6.0, V6.1, V6.2 or V6.3 to S7-REDCONNECT 2007 Edition	6GK1 716-0HB00-3AE1
		Power Pack S7-REDCONNECT 2007 Edition For expanding S7-1613 2007 to S7-REDCONNECT, single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English	6GK1 716-0HB70-3AC0

1) also S5-compatible communication

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1623

Overview



ISO	TCP/UDP	PN	MRP	OPC	PG/OP	S7/S5	IT
●	●			●	●	●	●

- PCI Express Card (PCIe x1) with an internal microprocessor for connection of PG/PC to Industrial Ethernet
- 10/100/1000 Mbit/s (Autosensing/Autocrossover/Autonegotiation)
- Integrated 2-port switch (2 x RJ45 connection)
- Communications services via
 - Open IE communication (TCP/IP and UDP)
 - ISO transport protocol
 - PG/OP communication
 - S7 communication
 - Open communication (SEND/RECEIVE)
- Time synchronization
- ISO and TCP/IP transport protocol on board
- SNMP-supported diagnostics
- The appropriate OPC server and configuration tools are included in the scope of supply of the respective communication software.

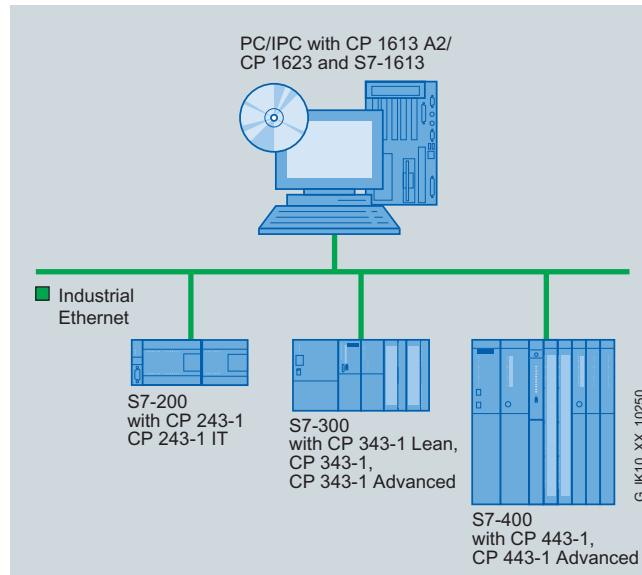
Benefits



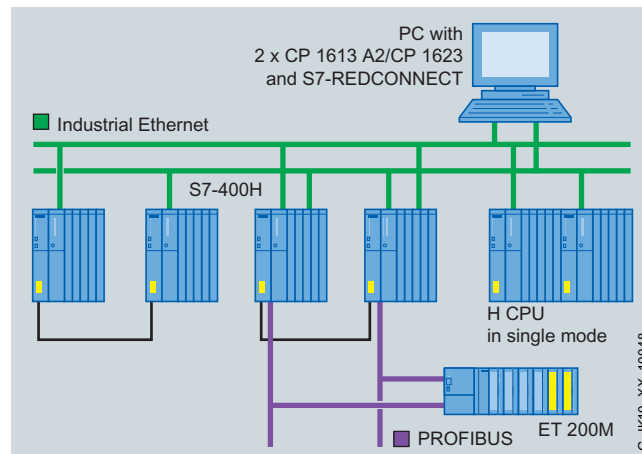
- Stable and constant data communication through protocol processing on the CP
- Available computer capacity for additional applications in PC, e.g. HMI (ISO and TCP/IP transport on board)
- Simple handling through Plug & Play and Autosensing/Autocrossover/Autonegotiation (10/100/1000 Mbit/s)
- Operation of large network configurations using one card through a high connection number
- Used for redundant communication
- Connection of additional field devices to the Industrial Ethernet by means of an additional switch port
- Switch operation possible via external power supply even with PC turned off
- OPC as standard interface
- Uniform approach and configuration functionality with NCM PC and STEP 7

Application

The CP 1623 makes it possible to connect to the Industrial Ethernet (10/100/1000 Mbit/s) for SIMATIC PG/PC and PCs with PCI Express slot. Additional field devices can be flexibly connected to the Industrial Ethernet via the integrated switch.



System configuration with CP 1613 A2/CP 1623 and S7-1613



Example of redundant network structure with CP 1613 A2/CP 1623 and S7-REDCONNECT

Design

Industrial Ethernet:

- 2 x RJ45 connection
- Integrated 2-port switch for 10/100/1000 Mbit/s (half/full/duplex)
- Autosensing/Autocrossover/Autonegotiation

PG/PC slot:

- PCI Express x1 card
- Can also be operated in PCIe x4-, x8- or x16 slots
- Installation via PCIe standard mechanisms (Plug & Play)

Power supply:

- Operating voltage 3.3 V/12 V via PCIe interface
- Optional external 12 - 24 V DC power supply for switch operation with PG/PC turned off

Size:

- Short PCIe format

Function

User interfaces

OPC interface

As a standard programming interface for the S7 communication and open communication protocols, the OPC server contained in the respective software package can be used to connect the automation technology to OPC-compatible Windows applications (Office, HMI systems, etc.).

Programming interface via C-library

The programming interfaces for the S7 communication, PG/OP communication, and open communication protocols for existing applications are implemented as Dynamic Link Library (DLL) interfaces.

You can find the released compilers in the Readme file of the SIMATIC NET CD products at

<http://www.siemens.com/automation/csi/net>

Software for PG/OP communication

This software makes it possible to program the SIMATIC S5 and S7 controllers via the Industrial Ethernet in conjunction with STEP 5/STEP 7 automation systems.

It is contained in all CP 1623 software packages.

Software for S7 communication (S7-1613 or S7-REDCONNECT)

The S7 interface allows PG/PC applications (e.g. WinCC) and user programs to access the SIMATIC S7 system components. This makes for easy and flexible access to SIMATIC S7 data.

S7 communication offers:

Administrative services

- Connection management
- Mini database
- Trace

Data transfer services

- Read/write variables
- BSEND/BRECEIVE

H-communication

For redundant S7-communication with a fault-tolerant S7-400 H system, the CP 1613/CP1623 can be used in connection with the S7-REDCONNECT software.

Software for open communication (SEND/RECEIVE)

This interface is used for communication between

- PG/PC and SIMATIC S5
- PG/PC and SIMATIC S7
- PG/PC and PG/PC

Open communication (SEND/RECEIVE) offers the following services:

- Management services
- Dial-up services
- Data transfer services

The software is included in the S7-1613 product.

How it works

The protocols up to and including Level 4 (transport) are independently processed on the module.

The internal memory is available for this purpose and it also provides for a large quantity structure and high communication reliability.

The data exchange between the module and host is done in Master-Mode operation. This means the CP 1623 accesses the physical RAM of the host.

A Windows driver transfers the data between the host system and the CP 1623. The transfer rate to the Industrial Ethernet is detected and automatically switched (Autosensing).

The IT functionality emerges in connection with the PC's Windows software.

Diagnostics

All MIB-2 objects can be read via SNMP. As a result, the current status of the Ethernet Interface can be called up.

Configuration

- The S7 communication and open communication protocols are configured in STEP 7 or NCM PC.
- The configuration tool NCM PC is included in the scope of supply of the CP 1623 software package.
- NCM PC is an integral component of advanced PC configuration.

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1623

Technical specifications

Order No.	6GK1 162-3AA00
Product type description	CP 1623
Transfer rate	
Transmission rate for auto-sensing for Industrial Ethernet	
• Minimum	10 Mbit/s
• Maximum	1000 Mbit/s
Interfaces	
Electrical connection version	
• the Industrial Ethernet interface	2 x RJ45 (TP)
• of the backplane bus	PCIe x1, V1.0a
• for voltage supply	1 x 2-pin terminal block
Supply voltage	
Type of supply voltage	DC
Supply voltage	
• 1 from backplane bus	3,3 V
• 2 from backplane bus	12 V
Supply voltage, external	
• Minimum	12 V
• Maximum	24 V
Relative symmetrical tolerance	
• at 3,3 V DC	5%
• at 12 V DC	5%
• at 24 V DC	33%
Current consumption	
Current consumed	
• 1 from backplane bus if DC, max.	850 mA
• 2 from backplane bus if DC, max.	400 mA
current taken from external supply voltage	
• at 12 V DC, max.	550 mA
• at 24 V DC, max.	300 mA

Order No.	6GK1 162-3AA00
Product type description	CP 1623
Power loss	
Effective power loss	7.6 W
Effective power loss in switch mode	
• Minimum	7.2 W
• Maximum	7.2 W
Permitted ambient conditions	
Ambient temperature	
• during operation	+5 ... +55 °C
• during transport	-20 ... +60 °C
• during storage	-20 ... +60 °C
Maximum relative humidity at 25 °C during operation	95%
Design, dimensions and weight	
Module format	PCI Express x1 card
• Height	167 mm
• Width	111 mm
Net weight	124 g
Performance data	
S7 communication	
Number of possible connections for S7/PG communication, max.	120
Open communication	
Number of possible connections for open communication by means of SEND/RECEIVE, max. ¹⁾	120
Multi-protocol operation	
Number of active connections in multi-protocol operation	120
Number of plug-in cards of the same type that can be plugged in for each PC station	4
Number of configurable connections for each PC station	207

¹⁾ also S5-compatible communication

PROFINET/Industrial Ethernet

System interfacing for PG/PC

CP 1623

2

Ordering data	Order No.		Order No.
CP 1623 communications processor PCI Express x1 card for connection to Industrial Ethernet (10/100/1000 Mbit/s) with 2 port switch (RJ45) connection via S7-1613 and S7-REDCONNECT, incl. drivers for 32-bit Windows XP Professional, 2003 Server, Windows Vista Ultimate/Business	6GK1 162-3AA00	Power Pack S7-REDCONNECT 2007 Edition For expanding S7-1613 2007 to S7-REDCONNECT, single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English	6GK1 716-0HB70-3AC0
S7-1613 2007 Edition Software for S7 and open communication, incl. PG/OP communication, OPC server and NCM PC; up to 120 connections, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; for CP 1613/CP 1613 A2/CP 1623; German/English • Single license for 1 installation • Software Update Service for 1 year, with automatic extension; requirement: Current software version • Upgrade S7-1613 from V6.4 to S7-1613 2007 Edition • Upgrade S7-1613 from V6.0, V6.1, V6.2 or V6.3 to S7-1613 2007 Edition	6GK1 716-1CB70-3AA0 6GK1 716-1CB00-3AL0 6GK1 716-1CB00-3AE0 6GK1 716-1CB00-3AE1	IE FC RJ45 Plug 4 x 2 RJ45 plug connector for Industrial Ethernet (10/100/1000 Mbit/s) with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; 180° cable outlet; for network components and CPs/CPUs with Industrial Ethernet interface • 1 pack = 1 unit • 1 pack = 10 units • 1 pack = 50 units	6GK1 901-1BB11-2AA0 6GK1 901-1BB11-2AB0 6GK1 901-1BB11-2AE0
S7-REDCONNECT 2007 Edition Software for fail-safe S7 communication over redundant networks incl. S7-OPC server, S7-1613 2007, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English • Single license for 1 installation • Software Update Service for 1 year, with automatic extension; requirement: Current software version • Upgrade S7-REDCONNECT from V6.4 to S7-REDCONNECT 2007 Edition • Upgrade S7-REDCONNECT from V6.0, V6.1, V6.2 or V6.3 to S7-REDCONNECT 2007 Edition	6GK1 716-0HB70-3AA0 6GK1 716-0HB00-3AL0 6GK1 716-0HB00-3AE0 6GK1 716-0HB00-3AE1	Switches SCALANCE X-400 Modular Industrial Ethernet switches with integrated RJ45 ports for setting up electrical and/or optical Industrial Ethernet networks; integrated redundancy manager, IT functions (RSTP, VLAN, etc.), PROFINET IO Device, network management via SNMP and web server; incl. operating instructions, Industrial Ethernet network manual and configuration software on CD-ROM; C-PLUG included in the scope of supply • SCALANCE X408-2; 4 x 10/100/1000 Mbit/s and 4 x 10/100 Mbit/s RJ45 ports; 2 x Gigabit/Fast Ethernet media module slots • SCALANCE X414-3E; 2 x 10/100/1000 Mbit/s and 12 x 10/100 Mbit/s RJ45 ports; 1 x Gigabit Ethernet and 2 x Fast Ethernet media module slots; 1 x Extender interface	6GK5 408-2FD00-2AA2 6GK5 414-3FC00-2AA2

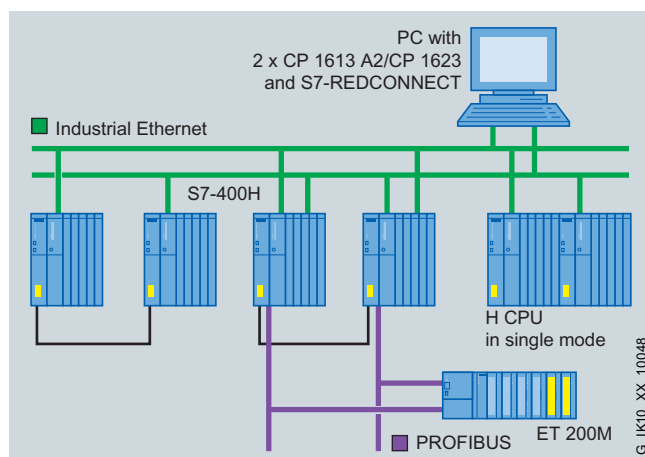
PROFINET/Industrial Ethernet

System interfacing for PG/PC

S7-REDCONNECT

Overview

- For connecting PCs over redundant Industrial Ethernet to the SIMATIC S7-400H
- Protected from communication failures arising from a fault in the double bus or in redundant rings
- For redundantly configured Industrial Ethernet
- Can also be implemented in non-redundant networks
- No additional programming overhead for the PC and in H systems
- The appropriate OPC server and configuration tools are included in the scope of supply of the respective communication software
- Enhanced redundancy over 4-way communication (STEP 7 V5.1 + SP4 and higher)



System configuration for S7-REDCONNECT

ISO	TCP/UDP	PN	MRP	OPC	PG/OP	S7/S5	IT
●				●	●	●	

Benefits



- Provides protection against communication failure in the event of a fault in the double bus or in redundant rings
- Simplifies communication of a PC application with the SIMATIC S7-400H system
- Safeguards previous investments due to the use of existing applications and the flexible application options
- No additional programming required for PC and H systems
- Increases the availability of the PC application (e.g. PCS 7) through redundant communication

Application

The software package S7-REDCONNECT connects the SIMATIC S7-400H to applications on the PC, e.g. WinCC.

Typically, a redundant Industrial Ethernet is used. The software package can also be used where SIMATIC H systems are operated on non-redundant networks.

Mixed operation of redundant and non-redundant systems is also possible.

Design

The following components are required to design a SIMATIC H system with PC connection

PC with:

- up to four CP 1613 A2/CP 1623 and S7-REDCONNECT to connect the PC to Industrial Ethernet with ISO protocol

S7-400H with:

- CP 443-1 to connect the S7-400H to Industrial Ethernet with ISO protocol
- STEP 7 V5.0 or higher for programming

Function

- S7-REDCONNECT contains the functional scope of the S7-1613 software package (S7-communication, open communication and PG/OP communication) as well as additional redundant communication over S7 connections. No additional license is required for S7-1613.
- Open communication
- Time synchronization
- Existing Windows applications can be used
- Services for monitoring the redundant communication
- Diagnostic tool for visualizing the communication status
- Simple redundancy over 2-way communication (STEP 7 V5.0 SP2 and higher)
- Enhanced redundancy over 4-way communication (STEP 7 V5.1 + SP4 and higher)

Fault-tolerant S7 communication is carried out via a standard connection and a standby connection. These are monitored during operation and switched in the event of a fault. With S7-REDCONNECT, these remain hidden from the PC application.

Fault detection, changeover (if required), communication monitoring, and synchronization are all invisible to the application.

The application, e.g. WinCC, communicates with both subunits of the S7-400H as with an S7-CPU.

User interfaces

OPC interface

As a standard programming interface for the S7 communication and open communication protocols, the OPC server contained in the respective software package can be used to connect the automation technology to OPC-compatible Windows applications (Office, HMI systems, etc.).

Programming interface via C-library

The programming interfaces for the S7 communication, PG/OP communication, open communication and TF protocol for existing applications are implemented as Dynamic Link Library (DLL) interfaces. You can find the released compilers in the Readme file of the SIMATIC NET CD products at <http://www.siemens.com/automation/csi/net>.

Configuration

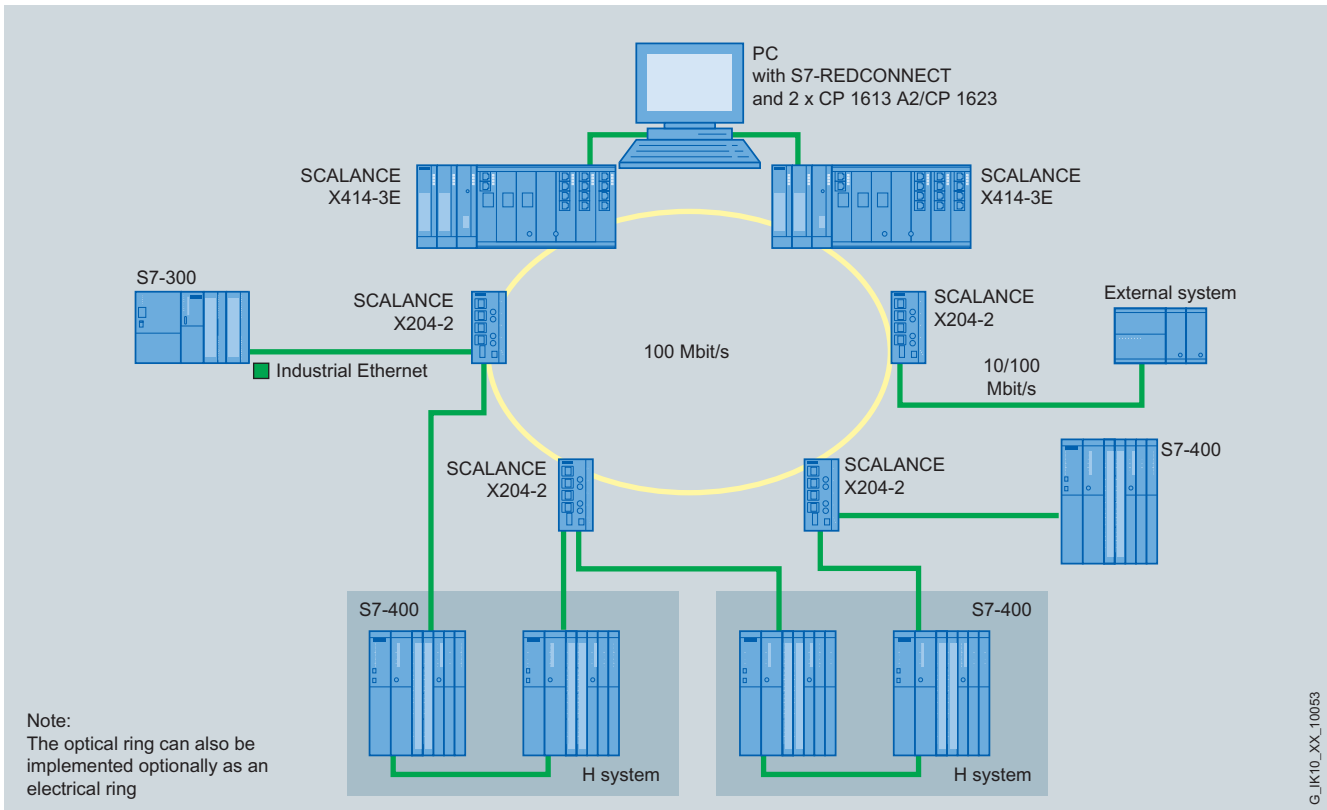
- The S7 communication and open communication protocols are configured in STEP 7 NCM PC V5.1 SP2 or higher.
- The NCM PC configuration tool is included in the scope of supply of the S7-REDCONNECT for Industrial Ethernet.
- NCM PC is a component part of Advanced PC Configuration.

PROFINET/Industrial Ethernet

System interfacing for PG/PC

S7-REDCONNECT

Integration



Redundant optical ring for connection of high-availability systems

Ordering data

Order No.

Order No.

S7-REDCONNECT 2007 Edition

Software for fail-safe S7 communication over redundant networks incl. S7-OPC server, S7-1613 2007, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English

- Single license for 1 installation
- Software Update Service for 1 year, with automatic extension; requirement: Current software version
- Upgrade S7-REDCONNECT from V6.4 to S7-REDCONNECT 2007 Edition
- Upgrade S7-REDCONNECT from V6.0, V6.1, V6.2 or V6.3 to S7-REDCONNECT 2007 Edition

6GK1 716-0HB70-3AA0

6GK1 716-0HB00-3AL0

6GK1 716-0HB00-3AE0

6GK1 716-0HB00-3AE1

Power Pack S7-REDCONNECT 2007 Edition

For expanding S7-1613 2007 to S7-REDCONNECT, single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English

CP 1613 A2 communications processor

PCI card (32-bit, 33 MHz/66 MHz; 3.3 V/5 V universal keyed) for connection to Industrial Ethernet (10/100 Mbit/s) with ITP and RJ45 connection over S7-1613 and S7-REDCONNECT, incl. driver for 32-bit Windows XP Professional, 2003 Server, Windows 2000 Professional/Server

CP 1623 communications processor

PCI Express x1 card (3.3 V/12) for connection to Industrial Ethernet (10/100/1000 Mbit/s) with 2-port switch (RJ45) connection via S7-1613 and S7-REDCONNECT, incl. driver for 32-bit Windows XP Professional, 2003 Server, Windows Vista Ultimate/Business

6GK1 716-0HB70-3AC0

6GK1 161-3AA01

6GK1 162-3AA00

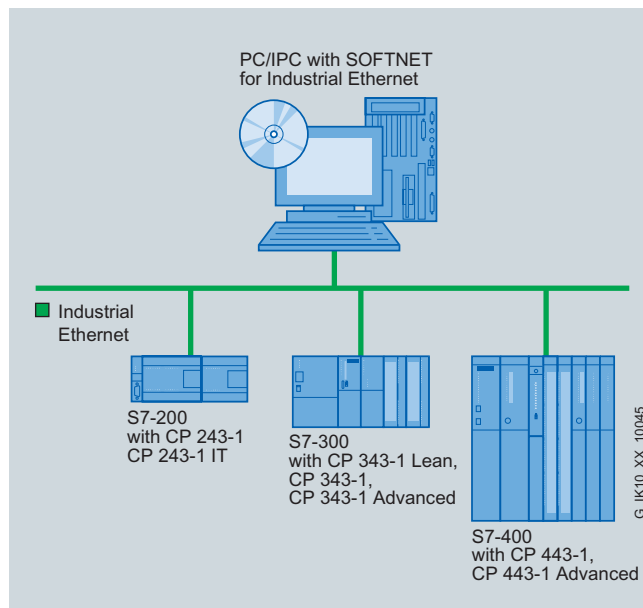
PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTNET for Industrial Ethernet

Overview

- For coupling programming devices/PCs/workstations to programmable controllers
- Communication services:
 - PG/OP communication
 - S7 communication
 - Open communication (SEND/RECEIVE)
- Can be used with
 - Layer 2 Ethernet card (PCI/PCle)
 - Integrated Industrial Ethernet interface
 - Modem (Remote Access Service RAS)
- Complete protocol stack as a software package
- The appropriate OPC server and configuration tools are included in the scope of supply of the respective communication software



System configuration SOFTNET for Industrial Ethernet

ISO	TCP/UDP	PN	MRP	OPC	PG/OP	S7/S5	IT
●	●			●	●	●	

Benefits



- Communication with SIMATIC over Industrial Ethernet
- OPC as standard interface
- Uniform procedure and configuration functions for NCM PC and STEP 7
- Versatile connection possibilities, e.g. via CP 2 Ethernet card, integral Industrial Ethernet interface, modem/ISDN (RAS)

Application

With SOFTNET for Industrial Ethernet, PC/PG and workstations can be connected to programmable controllers, such as SIMATIC S7, over Industrial Ethernet.

The following user interfaces are available:

- PG/OP communication for SIMATIC S7
- Open communication (SEND/RECEIVE) for communication with SIMATIC S5 and S7
- S7 communication

SOFTNET is available for the following interfaces:

- Layer 2 Ethernet card (PCI/PCle)
- integrated Industrial Ethernet interface
- Modem/ISDN (Remote Access Service RAS)

Function

With SOFTNET, the complete protocol stack is processed in the PC.

This architecture means that in contrast to the CP 1613 or CP 1623 products, the performance of the SOFTNET packages is dependent on the configuration or loading of the PC used.

The IT functionality is established in connection with the interfaces and the PC's Windows software.

User interfaces

OPC interface

As a standard programming interface for the S7 communication and open communication protocols, the OPC server contained in the respective software package can be used to connect the automation technology to OPC-compatible Windows applications (Office, HMI systems, etc.).

Programming interface via C-library

The programming interfaces for the S7 communication, PG/OP communication, and open communication protocols for existing applications are implemented as a Dynamic Link Library (DLL).

You can find the released compilers in the Readme file of the SIMATIC NET CD products at <http://www.siemens.com/automation/csi/net>.

Software for PG/OP communication

This software makes it possible to program the SIMATIC S5 and S7 controllers via the Industrial Ethernet in conjunction with STEP 5/STEP 7.

Software for S7 communication

SIMATIC S7 system components communicate with each other using S7 communication functions.

The S7 communication can be based optionally on the ISO protocol or the TCP/IP protocol.

S7 communication offers the following services:

- Administrative services
- S7 connection management services
- Variable services
- VFD (Virtual Field Device) services
- Trace and mini database

Open communication (SEND/RECEIVE)

This interface based on Layer 4 (ISO Transport or TCP/IP with RFC 1006) is used for communication between

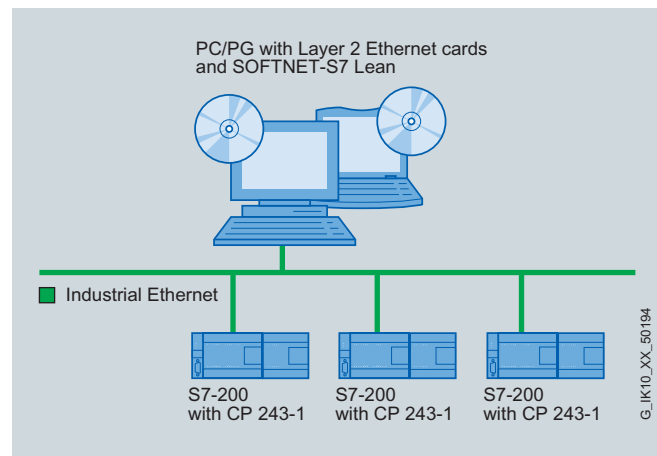
- PG/PC and SIMATIC S5
- PG/PC and SIMATIC S7
- PG/PC and PG/PC

Open communication (SEND/RECEIVE) offers the following services:

- Management services
- Dial-up services
- Data transfer services

Configuration

- The complete configuration of the S7 communication and open communication protocols takes place in STEP 7 or SIMATIC NCM PC V5.1 SP2 or higher.
- The NCM PC configuration tool is included in the scope of delivery of the corresponding packages.



System configuration with SOFTNET-S7 Lean for Industrial Ethernet and S7-200

PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTNET for Industrial Ethernet

Technical specifications

Product type description	SOFTNET for Industrial Ethernet
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Performance data

S7 and PG/OP communication (number of operable connections)

• SOFTNET-S7	max. 64
• SOFTNET-S7 Lean	max. 8

Ordering data

Order No.

SOFTNET Edition 2007 for Industrial Ethernet

Software for S7 and open communication, incl. OPC server, PG/OP communication and NCM PC, runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; German/English

SOFTNET-S7 2007 Edition for Industrial Ethernet

up to 64 connections

- Single license for 1 installation
- Software Update Service for 1 year, with automatic extension; requirement: Current software version
- Upgrade from V6.4 to 2007 edition
- Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition

6GK1 704-1CW70-3AA0

6GK1 704-1CW00-3AL0

6GK1 704-1CW00-3AE0

6GK1 704-1CW00-3AE1

SOFTNET-S7 Lean 2007 Edition for Industrial Ethernet

up to 8 connections

- Single license for 1 installation
- Software Update Service for 1 year, with automatic extension; requirement: Current software version
- Upgrade from V6.4 to 2007 Edition
- Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition

6GK1 704-1LW70-3AA0

6GK1 704-1LW00-3AL0

6GK1 704-1LW00-3AE0

6GK1 704-1LW00-3AE1

SOFTNET-PG Edition 2007 for Industrial Ethernet

Software for PG/OP-communication; runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; German/English

- Single license for 1 installation
- Software Update Service for 1 year, with automatic extension; requirement: Current software version
- Upgrade from V6.4 to 2007 Edition
- Upgrade from V6.0, V6.1, V6.2 or V6.3 to 2007 Edition

6GK1 704-1PW70-3AA0

6GK1 704-1PW00-3AL0

6GK1 704-1PW00-3AE0

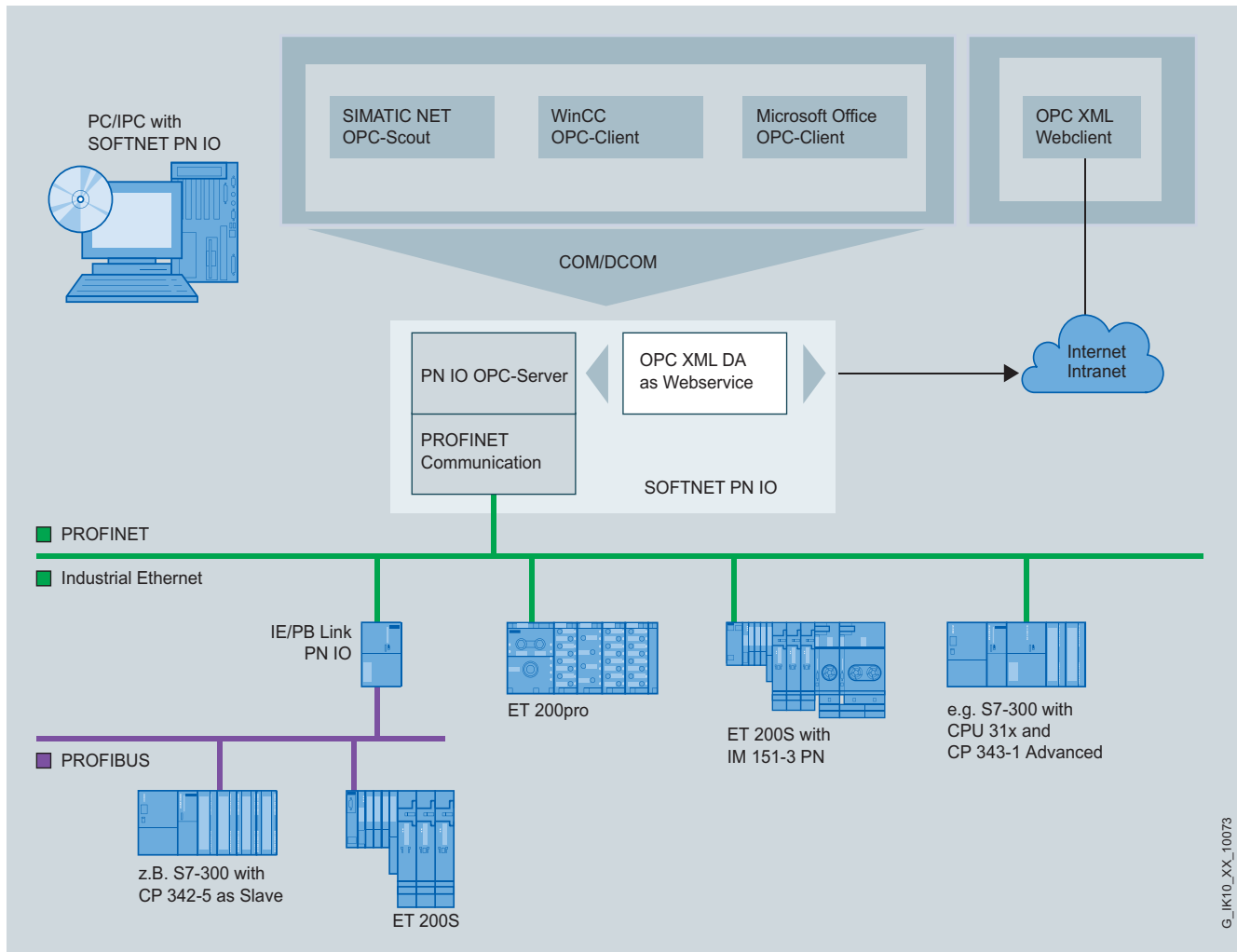
6GK1 704-1PW00-3AE1

PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTNET PN IO

Overview



PC with SOFTNET PN IO as PROFINET IO Controller

ISO	TCP/UDP	PN	MRP	OPC	PG/OP	S7/S5	IT
	●	●		●			

Benefits



- Software with PROFINET IO Controller function for coupling PG/PC and IPC with PROFINET IO Devices
- Possible applications:
 - PC-based control systems
 - HMI systems
 - Test applications
- Communication services:
 - PROFINET IO Controller
- Can be used with
 - Integrated interfaces of SIMATIC PG/PC
 - You can find more information about the environment of use at www.siemens.com/simatic-net/ik-info
- Cost-effective solution for the low-end performance range
- OPC server for I/O interfacing over PROFINET included in scope of supply

- Cost-effective interfacing of field devices to Industrial Ethernet with PROFINET
- Simple porting of the application with OPC as a standard interface
- High-performance IO data access through RT Base interface for linking into C/C++ applications
- Simple changeover from PROFIBUS modules CP 5613 A2/CP 5614 A2 with DP-Base interface to PROFINET through IO-Base interface
- Uniform procedure and configuration functions for NCM PC and STEP 7

PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTNET PN IO

Application



Using SOFTNET PN IO, PCs can be linked with PROFINET field devices including PC-based PN IO devices (e.g. with CP 1616 or CP 1604) via Industrial Ethernet.

SOFTNET PN IO is available for the following interfaces:

- Integrated interfaces of SIMATIC PG/PC

Function

PROFINET communication

- *PROFINET IO-Controller*
Connection of field devices to Industrial Ethernet with PROFINET

User interfaces

- *OPC interface*
The supplied OPC server can be used as a standard programming interface for PROFINET IO-Controller to link automation applications to OPC-capable Windows applications (Office, HMI systems, etc.).
- *Programming interface through C library:*
For applications that want to use the PROFINET IO-Controller functionality directly in C/C++, the IO-Base interface can be used. This interface is of a similar design to the DP Base interface of PROFIBUS modules CP 5613 A2 and CP 5614 A2. It is therefore possible to port existing PROFIBUS DP master applications to PN IO-Controller applications.
- You can find the released compilers in the Readme file of the SIMATIC NET CD products at <http://www.siemens.com/automation/csi/net>.

SOFTNET PN IO and CP 1616 use compatible functions of the IO-Base interface.

Mode of operation

With SOFTNET, the complete protocol stack is processed in the PC. This architecture means that the performance depends on the configuration of the PC used or the loading on the PC.

Configuration

- Configuration is performed with STEP 7/NCM PC, V5.3 SP1 and higher

Technical specifications

Order No.	
Product type description	SOFTNET PN IO
Performance data	
• Number of operable IO devices	Max. 64
• Number of external IO-lines in one central rack	Max. 1
• Size of IO data areas overall	
- I/O input area	Max. 2 KB
- I/O output area	Max. 2 KB
• Size of I/O data area per connected I/O device	
- I/O input range	Max. 1433 byte
- I/O output range	Max. 1433 byte

Ordering data

Ordering data	Order No.
SOFTNET PN IO, 2007 Edition	
Software for PROFINET IO controller with OPC server and NCM PC; runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2; German/English	
• Single license for one installation	6GK1 704-1HW70-3AA0
• Software Update Service for 1 year, with automatic extension; requirement: Current software version	6GK1 704-1HW00-3AL0
• Upgrade SOFTNET-PN IO from V6.4 to SOFTNET-PN IO, 2007 Edition	6GK1 704-1HW00-3AE0
• Upgrade SOFTNET-PN IO from V6.0, V6.1, V6.2 or V6.3 to SOFTNET-PN IO 2007 Edition	6GK1 704-1HW00-3AE1

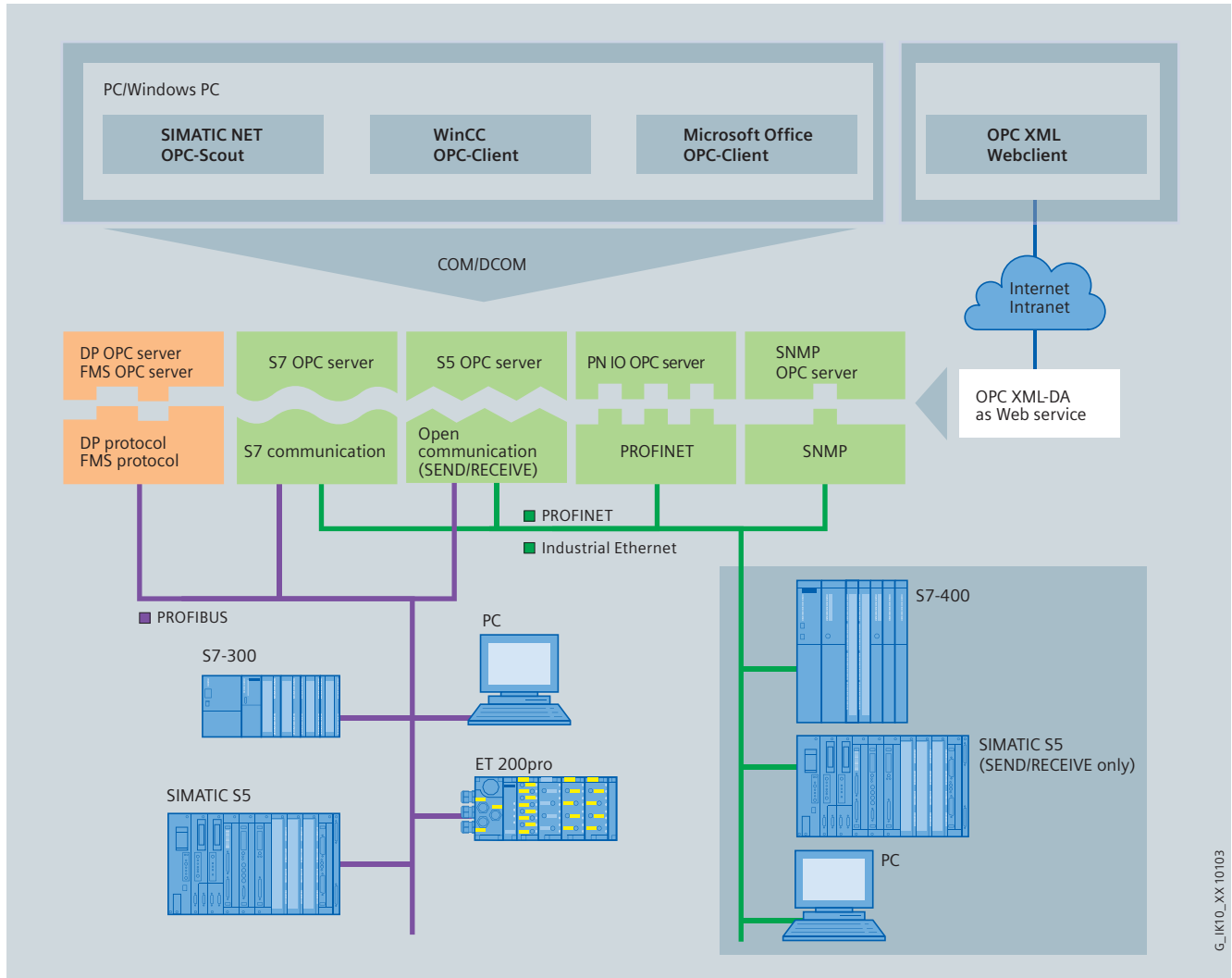
PROFINET/Industrial Ethernet

System interfacing for PG/PC

OPC server for Industrial Ethernet

Overview

- The appropriate OPC servers are included in the scope of supply of the respective communication software
- Standardized, open multi-vendor interface
- It permits interfacing of OPC-capable Windows applications to S7-communication, open communication (SEND/RECEIVE), PROFINET and SNMP.
- OPC Scout with browser functionality as an OPC client and OCX Data Control



System integration with OPC server

Benefits



- Different networks and protocols can be used easily thanks to the uniform interface
- Reduced training and familiarization costs
- Easy interfacing in the system environment and office applications over C++, Visual Basic and .NET interfaces
- Fast creation of applications
- Easy handling and cost-effective because the corresponding OPC server is included in the scope of supply of the respective communications software

PROFINET/Industrial Ethernet

System interfacing for PG/PC

OPC server for Industrial Ethernet

Application

OPC (Openness, Productivity & Collaboration) is implemented as an expansion of the COM (Component Object Model) communications interface and DCOM (Distributed COM) for the user software.

The basic principle of OPC is that OPC client applications communicate with the OPC server over a standardized, open and manufacturer-independent interface.

It is also possible to connect to OPC-capable Windows applications (Microsoft Office or HMI systems) that are already available on the market.

The following communication possibilities are available for Industrial Ethernet with OPC server:

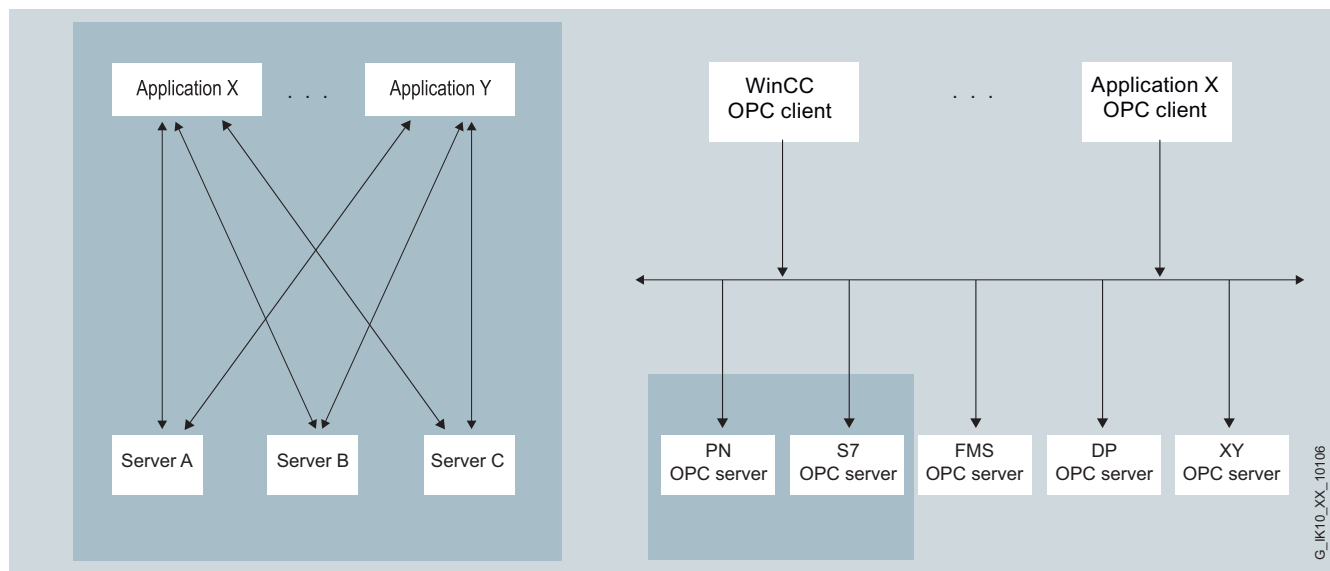
- S7 communication
- Open communication (SEND/RECEIVE)
- PROFINET
- SNMP (Simple Network Management Protocol)

The OPC server offers:

- Data Access interfaces 2.0, 2.05a and 3.0
- Alarm and event interface 1.1
- OPC XML DA interface 1.0
- Integration of automation products of different manufacturers
- Uniform, easy user interface for different components
- Can be accessed from every computer in the LAN
- High-performance data access over the Custom Interface (C++, NET)
- Easy to use with the "Automation Interface" (VB, NET) or the supplied OCX Data Control
- Grouping of variables (Items); which allows a large quantity of data to be pre-processed in a short time.

Function

- Open standardization of the addressing using logical names for objects from an automation component or an automation system
- Supports STEP 7 symbols
- Efficient data transfer from a process component to an application for further processing
- One client application can use several servers simultaneously
- Simultaneous execution of more than one client is possible on one OPC server
- Communication protocols can be used in parallel by means of the multiplexer function
- Interfaces
 - "Custom Interface" for high-performance C++/NET applications
 - "Automation Interface" for easily created Visual Basic applications (or similar)
 - XML DA interface; Data access to S7 CPUs is therefore possible over the Internet.
 - OCX Data Control for direct embedding in Windows applications that support COM/DCOM



Comparison of conventional client/server architecture with an OPC architecture

Configuration

The communication parameters are configured using only the tools of the installed software Advanced PC Configuration (configuration console, SIMATIC NCM PC or from STEP 7 V5.1 + SP2); SIMATIC iMAP is used for PROFINET CBA.

PROFINET/Industrial Ethernet

System interfacing for PG/PC

OPC server for Industrial Ethernet

2

Technical specifications		Ordering data	Order No.
Product type description	OPC server for Industrial Ethernet	PN CBA OPC Server, 2007 Edition	
Programming	<ul style="list-style-type: none"> Synchronous and asynchronous reading and writing of variables Monitoring of variables using the OPC server with a signal to the client when a change occurs Use of quantity operations; so a large amount of data can be processed in a short time. 	PROFINET OPC server for CBA; runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English	
Interfaces	<ul style="list-style-type: none"> Custom Interface (C++, NET) for high OPC performance Automation Interface (VB, Excel, Access, Delphi, ...) for ease-of-use Graphics with OCX for configuring instead of programming OPC XML-Interface for Data Access 	<ul style="list-style-type: none"> Single license for 1 installation Software Update Service for 1 year, with automatic extension; requirement: Current software version Upgrade from Edition 2006 to Edition 2007, single license Upgrade from V6.0 to Edition 2007, single license 	6GK1 706-0HB70-3AA0 6GK1 706-0HB00-3AL0 6GK1 706-0HB00-3AE0 6GK1 706-0HB00-3AE1
Products	include OPC servers for:	SNMP OPC Server 2007 Edition	
Industrial Ethernet	S7-OPC server for S7 communication, XML-DA S5-OPC server for open communication ¹⁾ communication, XML-DA SNMP OPC server for SNMP protocol access; XML-DA	Including MIB compiler; single license for 1 installation of the runtime software, software and electronic manual on CD-ROM; license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2; Windows 2003 Server SP1, R2, SP2; Windows Vista Business/Ultimate; German/English	
PROFINET	• SOFTNET PN IO • PN CBA OPC server	• Basic 2007 Administration of up to 20 IP addresses; Single license for 1 installation - Upgrade from Edition 2006 to Edition 2007, single license - Upgrade from V6.0 to Edition 2007, single license	6GK1 706-1NW70-3AA0 6GK1 706-1NW00-3AE0 6GK1 706-1NW00-3AE1
PROFIBUS	• DP-5613, SOFTNET-DP, SOFTNET-DP slave • FMS-5613	• Extended 2007 Administration of up to 200 IP addresses - Upgrade from Edition 2006 to Edition 2007, single license - Upgrade from V6.0 to Edition 2007, single license • Power Pack 2007; upgrade from SNMP OPC Server Basic to SNMP OPC Server Extended 2007 Edition	6GK1 706-1NX70-3AA0 6GK1 706-1NX00-3AE0 6GK1 706-1NX00-3AE1 6GK1 706-1NW70-3AC0

¹⁾ also S5-compatible communication

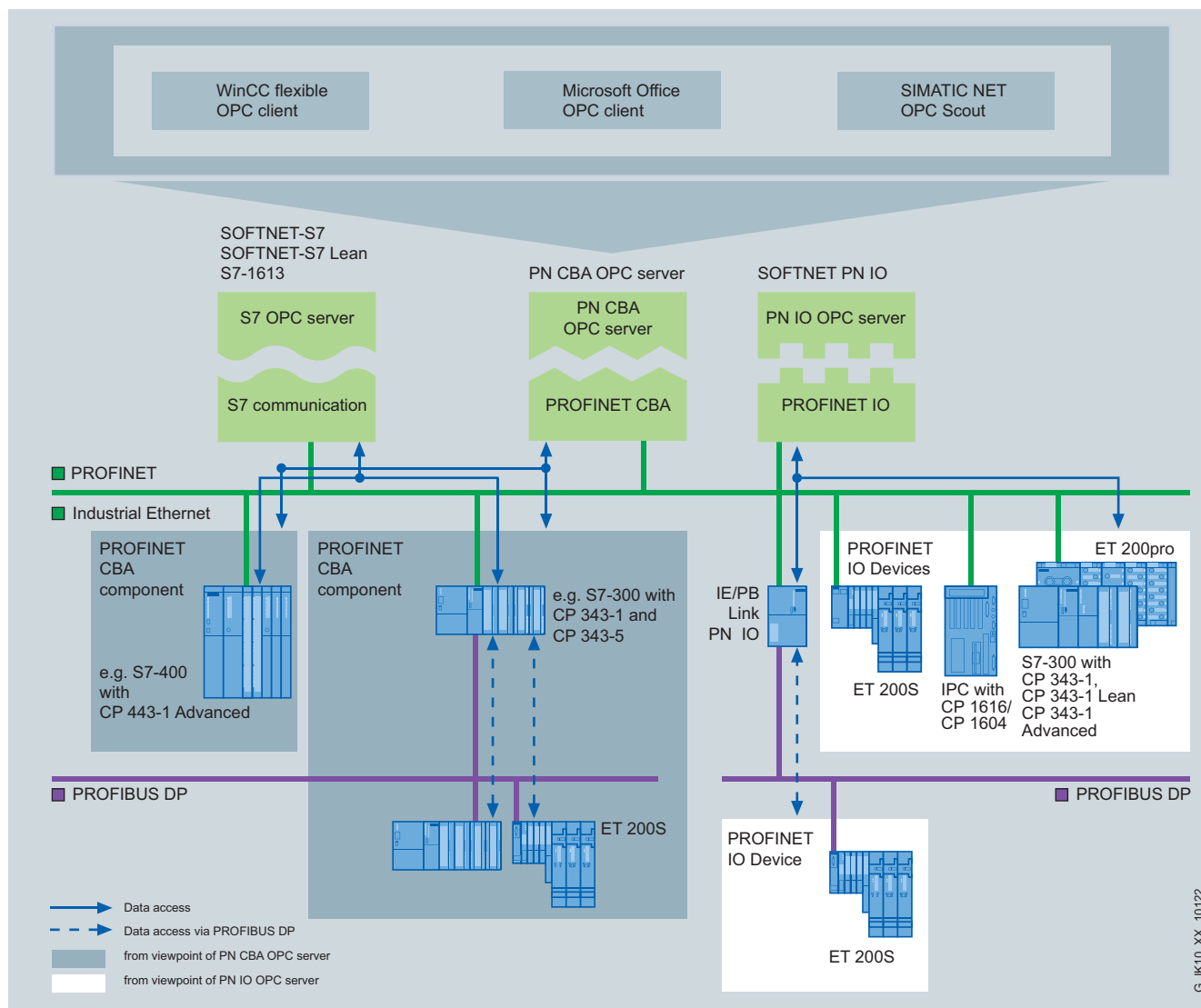
PROFINET/Industrial Ethernet

System interfacing for PG/PC

PN CBA OPC server

Overview

- Access to variables in PROFINET CBA components over the OPC interface
- Use of the objects and symbols defined using the PROFINET engineering tool SIMATIC iMap and STEP 7
- Adding PROFINET functionality to existing installations. This enables it to be used in parallel with other communication protocols such as S7 communication with SOFTNET-S7 for Industrial Ethernet.
- OPC Scout as an OPC client with browser functions for the variables of the PROFINET CBA components



System integration with the PN CBA OPC server

Benefits



- Complete integration of the PN CBA OPC server in the SIMATIC NET OPC server environment
- Supports distributed automation solutions with PROFINET CBA
- Directly uses the variables and symbols defined with the PROFINET engineering tool SIMATIC iMap and STEP 7
- Operates in parallel with other communication protocols such as S7 communication over SOFTNET-S7 and Industrial Ethernet. This means that existing installations can also be expanded with the PROFINET functionality
- The standardized OPC interface means that from the start C++, Visual Basic and .NET applications as well as general OPC clients (such as Microsoft Office) can participate in the new PROFINET concept

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PROFINET/Industrial Ethernet

System interfacing for PG/PC

PN CBA OPC server

2

Application

- The PN CBA OPC server (PROFINET OPC server) is the PC application interface for communication over Industrial Ethernet with PROFINET CBA components.
- OPC client applications communicate with the PN CBA OPC server over a standardized, open and manufacturer-independent interface.
- The PN CBA OPC server offers:
 - Standardized access for OPC-capable applications and Windows applications (e.g. Microsoft Office) to variables that are available on the component interface of the PROFINET CBA components.
 - High-performance data access over the "Custom Interface" (C++, .NET)
 - Easy to use with the "Automation Interface" (VB, .NET) and the OCX Data Control included in the scope of supply.
 - Internet communication over OPC XML DA Interface
- Based on the PROFINET standard. This standard supports:
 - Component technology in automation engineering
 - Graphical configuration of communication between intelligent devices instead of complex programming
 - Manufacturer-independent, plant-wide engineering
 - Vertical integration, i.e. the user can access the interface variables of a PROFINET component by means of IT standards and an OPC interface over Industrial Ethernet.

Function

- The PN CBA OPC server communicates with PROFINET CBA components over Industrial Ethernet by means of DCOM protocol
- Open standardization of the addressing using logical names for objects from an automation component or an automation system
- Operation in parallel with other protocols is possible, such as
 - S7 communication
 - Open communication (SEND/RECEIVE)
- Efficient data transfer from a process component to an application for further processing:
 - Synchronous and asynchronous reading and writing of variables
 - Monitoring of variables using the OPC server with a signal to the client when a change occurs
 - Use of quantity operations; a large amount of data can be processed in a short time.
- Simultaneous execution of more than one client is possible on one OPC server
- OPC Scout as an OPC client with browser functions for all interface variables of the PROFINET CBA components

User interfaces

- "Custom Interface" for high-performance C++/.NET applications
- "Automation Interface" for easily created Visual Basic applications (or similar)
- XML DA interface;
Data access to S7 CPUs is therefore possible over the Internet.
- OCX Data Control for direct embedding in Windows applications that support COM/DCOM

Configuration

- For configuring the PROFINET communication, a separate engineering tool SIMATIC iMap is required. This tool is offered as an option package with STEP 7.
- With SIMATIC iMAP, the communication links between PROFINET CBA components are graphically configured. In addition to the interconnection data, the engineering tool also creates the data used to access the interface variables over the PN CBA OPC server from visualization systems or office applications.

PROFINET/Industrial Ethernet

System interfacing for PG/PC

PN CBA OPC server

Technical specifications

Product type description	PN CBA OPC server
Programming	<ul style="list-style-type: none"> • Open and standardized • Synchronous and asynchronous reading and writing of variables • Monitoring of variables by the OPC server with an alarm message to the client in the case of a change • Use of batch operations, so a large volume of data can be processed in a short time
Interfaces	<ul style="list-style-type: none"> • Custom Interface (C++, .NET) • Automation Interface (Visual Basic, Excel, Access,...) • OPC Data Control • OPC XML Interface for Data Access • DCOM protocol
Protocols	
Configuration	Configuring software for PROFINET SIMATIC iMap
PROFINET communication (CBA)	
• Number of communication partners	max. 228
• Number of connections	max. 10,000

Ordering data

Order No.

PN CBA OPC Server, 2007 Edition

PROFINET OPC server for CBA; runtime software, software and electronic manual on CD-ROM, license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; German/English

- Single license for 1 installation

6GK1 706-0HB70-3AA0

- Software Update Service for 1 year, with automatic extension; requirement: Current software version

6GK1 706-0HB00-3AL0

- Upgrade of PN CBA OPC Server from V6.4 to PN CBA OPC Server 2007 Edition

6GK1 706-0HB00-3AE0

- Upgrade of PN CBA OPC Server from V6.0, V6.1, V6.2 or V6.3 to PN CBA OPC Server 2007 Edition

6GK1 706-0HB00-3AE1

Software iMap V3.0

for configuring PROFINET CBA

Requirement:

Windows 2000 Prof. with Service Pack 4 or later or Windows XP Prof. with Service Pack 1 or later or Windows 2003 Server with Service Pack 1 or later; on PG or PC with Pentium processor, min. 1 GHz; STEP 7 V5.3 or later with Service Pack 3, PN OPC Server V6.3 or later

Type of supply:

German, English with electronic documentation

- Single license
- Software Update Service
- Upgrade to V3.0, single license

6ES7 820-0CC04-0YA5

6ES7 820-0CC01-0YX2

6ES7 820-0CC04-0YE5

More information

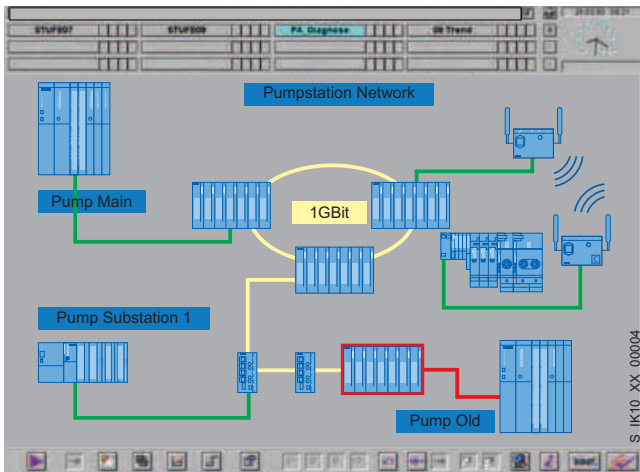
Additional information can be found in the Internet under:
<http://www.siemens.com/cba>

PROFINET/Industrial Ethernet

System interfacing for PG/PC

SNMP OPC server

Overview



- Status monitoring and network management of SNMP-capable devices in any OPC client systems; e.g. SIMATIC HMI/SCADA, office application
- Easy access to SNMP-capable devices over the OPC interface
- Devices without SNMP agents can be monitored using the ping mechanism
- Complete integration in the SIMATIC NET OPC server environment
- SNMP can be implemented in parallel with other communications protocols such as PROFINET or S7 communication
- Configuring with STEP 7 or NCM PC
- Autodiscovery function for integrating accessible Ethernet devices (STEP 7 V5.3+SP3 or higher)

Benefits



- Network view and process view in a single system
- Easy network diagnostics in SIMATIC HMI/SCADA systems and office applications
- Easy configuration and engineering without the need for detailed knowledge of SNMP. Embedded in the SIMATIC tool landscape
- It can operate in parallel with other communication protocols

Application

The SNMP OPC server makes data available for the administration of TCP/IP networks for any OPC client systems.

SNMP (Simple Network Management Protocol) is a protocol that has been specifically designed for administration of TCP/IP networks. The individual nodes in the network (network components or data terminals) are equipped with a so-called SNMP agent that provides information in structured form.

OPC (Openness, Productivity & Collaboration) provides a standardized, open, multi-vendor interface for automation engineering.

The SNMP OPC server supports access to device information over the OPC interface. This means that network visualization, system diagnostics and plant status monitoring can be implemented in any OPC client systems (with OPC clients such as WinCC, WinCC flexible, PCS 7). In addition to simple device diagnostics, detailed information such as redundant network structures or network load distribution can be displayed. This increases the operational safety and improves the availability of the plant.

The device information can be visualized according to individual requirements and can be adapted to the special requirements of the respective customer installation. The information that is made available can also be integrated into the signaling system and alarm log of an HMI/SCADA system for example.

Using the SNMP information, it is possible to expand an existing HMI/SCADA system as far as a customer-specific network management station.

The SNMP OPC server can be operated over the following interfaces:

- CP 1613 A2 (PCI, 32-bit)
- CP 1623 (PCIe, 32-bit)
- Integral Industrial Ethernet interface of SIMATIC programming devices/PCs

PROFINET/Industrial Ethernet

System interfacing for PG/PC

SNMP OPC server

Function

The SNMP OPC server supports access to SNMP-capable devices in the OPC client systems. For all configured TCP/IP devices that are not SNMP-capable, one OPC variable for sign-of-life monitoring (ICMP-PING) is offered.

Read access and in part write access to the respective device information is possible. Thus the diagnosis of individual devices is possible as well as diagnosis of the complete plant and device characteristics can be actively controlled.

STEP 7/NCM PC contains an MIB compiler (Management Information Base) for integrating SNMP-enabled devices. This allows device profiles to be created on the basis of an MIB file

Devices with SNMP agents:

SIMATIC NET devices that feature special SNMP agents such as switches, WLAN Access Points and Industrial Ethernet PC and S7 communication processors are already included complete with their device profiles.

Thanks to MIB compilers (Management Information Base), other SNMP-enabled devices can be integrated into the OPC configuration through loading of MIBs in accordance with the SMI V1 and SMI V2 standard from STEP 7 V5.4.

Devices with IP addresses without SNMP agents:

Devices without SNMP agents can be monitored using the ping mechanism. The user can edit and save device-specific information such as the contact person, site and device description for this purpose.

- Any SNMP-capable devices such as printers or PCs can be depicted using a predefined library.
- The devices are integrated into the desktop of a client application using preconfigured ActiveX Controls.

The predefined device profiles and the associated ActiveX controls allow easy administration of the devices in OPC client applications. Individual expansions can also be implemented.

The SNMP OPC server is integrated in the SIMATIC NET OPC server. The OPC Scout is also included in the functional scope for browsing the displayed SNMP information. The SNMP OPC server can use, for example, PROFINET or S7 communication at the same time as PROFIBUS and Industrial Ethernet communication. This means that existing installations can also be expanded with SNMP functionality. The SNMP OPC server also enables several clients to execute simultaneously on one server.

User interfaces

- "Custom Interface" for high-performance C++ applications
- "Automation Interface" for easily created Visual Basic applications (or similar).
- OPC Data Control for easy creation of client applications by configuring ActiveX controls
- OPC Alarms & Events (Subset)
- Preconfigured ActiveX controls for the device profile used

Configuration

The NCM PC configuration tool is included in the scope of supply of the CP 1613/1623 software packages and SOFTNET for Industrial Ethernet.

Ordering data

Order No.

SNMP OPC Server 2007 Edition

Including MIB compiler; single license for 1 installation of the runtime software, software and electronic manual on CD-ROM; license key on USB stick, Class A, for 32-bit Windows XP Professional SP1, 2, Windows 2003 Server SP1, R2, SP2, Windows Vista Business/Ultimate; German/English

• **Basic 2007**

Administration of up to 20 IP addresses; Single license for 1 installation

- Upgrade of SNMP OPC Server Basic from V6.4 to SNMP OPC Server Basic 2007 Edition

- Upgrade of SNMP OPC Server Basic from V6.0, V6.1, V6.2 or V6.3 to SNMP OPC Server Basic 2007 Edition

• **Extended 2007**

Administration of up to 200 IP addresses

- Upgrade of SNMP OPC Server Extended from V6.4 to SNMP OPC Server Extended 2007 Edition

- Upgrade of SNMP OPC Server Extended from V6.0, V6.1, V6.2 or V6.3 to SNMP OPC Server Extended 2007 Edition

• **Power Pack 2007;**

upgrade from SNM OPC Server Basic to SNM OPC Server Extended 2007 Edition

6GK1 706-1NW70-3AA0

6GK1 706-1NW00-3AE0

6GK1 706-1NW00-3AE1

6GK1 706-1NX70-3AA0

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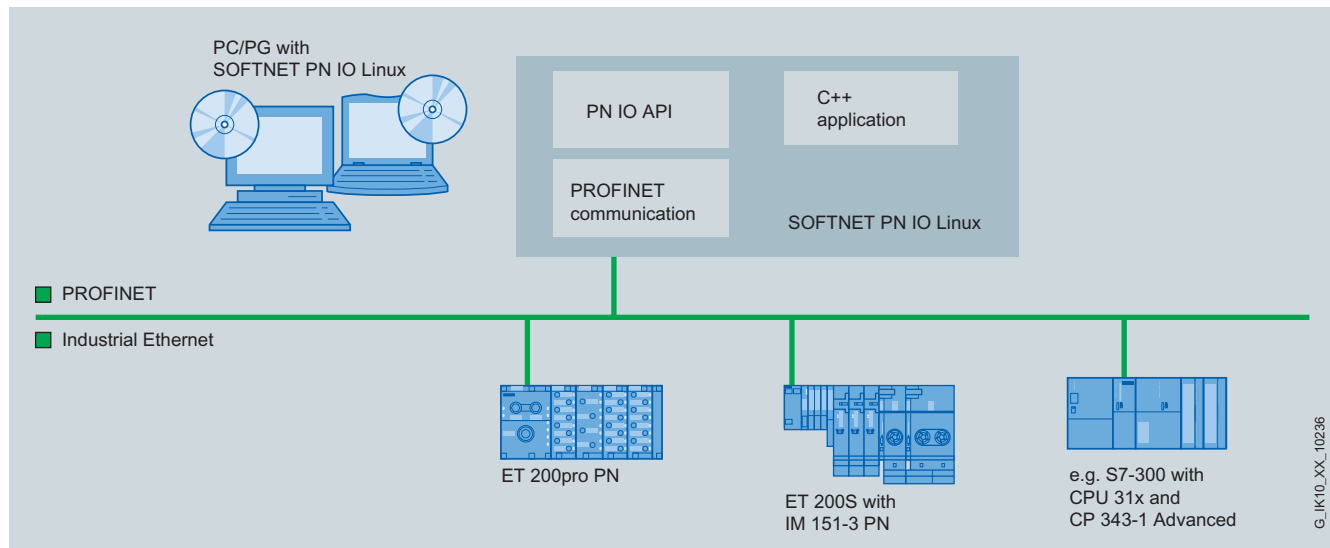
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PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTNET PN IO Linux

Overview



PC with SOFTNET PN IO Linux as PROFINET IO Controller

- Software with PROFINET IO Controller function for coupling PCs and IPCs with PROFINET IO Devices
- Possible applications:
 - PC-based control systems
 - HMI systems
 - Test applications
- Communication services:
 - PROFINET IO Controller
- Can be used in combination with integrated Ethernet interface
- Cost-effective solution for the low-end performance range

PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTNET PN IO Linux

Benefits



- Cost-effective interfacing of field devices to Industrial Ethernet with PROFINET
- High-performance access to IO data through IO-Base interface for integration into C/C++ applications
- Simple changeover from CP 5613 A2/CP 5614 A2 PROFIBUS modules with DP-Base interface to PROFINET through IO-Base interface
- Uniform approach and configuration functionality with NCM PC and STEP 7

Application

Using SOFTNET PN IO Linux, PCs can be linked with PN field devices including PC-based PN IO Devices (e.g. with CP 1616 or CP 1604) via Industrial Ethernet.

SOFTNET PN IO Linux is available for the following interfaces:

- Integrated Ethernet interfaces

Function

PROFINET communication

- *PROFINET IO Controller*
Connection of field devices to Industrial Ethernet with PROFINET

User interfaces

- *Programming interface via C-Library*:
for the integration of the PROFINET IO Controller functionality, the IO base interface can be used. In terms of design, this interface is based on the DP base interface of the PROFIBUS modules CP 5613 A2 and CP 5614 A2. Therefore, the porting of existing PROFIBUS DP master applications to PN IO Controller applications is also possible and easy.

SOFTNET PN IO Linux and CP 1616 use compatible functions of the IO Base interface.

Mode of operation

For SOFTNET, the entire protocol stack is handled in the PC. This architecture means that the performance depends on the configuration of the PC used or the loading on the PC.

Configuration

- The configuration is done in STEP 7/NCM PC as of V5.3 SP1

Technical specifications

Order No.	2XV9 450-1PN00
Product type description	SOFTNET PN IO Linux
Performance data	
• Number of operable IO Devices	max. 64
• Number of external IO lines in one central rack	max. 1
• Size of IO data areas overall	
- I/O input range	Max. 2 KB
- I/O output range	Max. 2 KB
• Size of I/O data area per connected IO Device	
- I/O input range	Max. 1433 bytes
- I/O output range	Max. 1433 bytes

Ordering data

SOFTNET PN IO Linux

Software for PROFINET IO Controller; runtime software, software and electronic manual on CD-ROM, for Linux Kernel 2.6.x and glibc 2.3.x; German/English

- Single License for one installation

Order No.

2XV9 450-1PN00

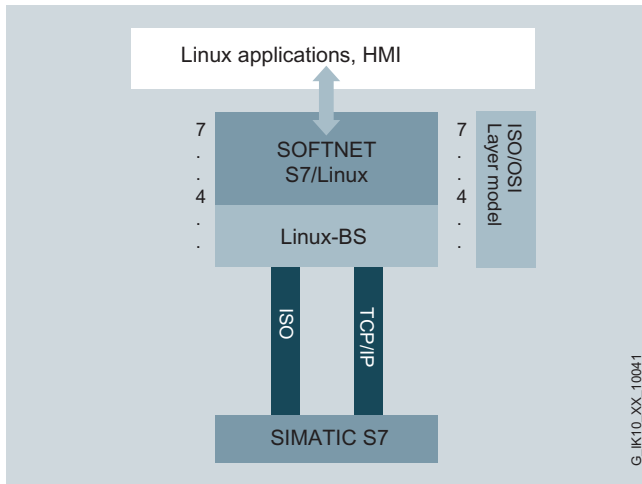
PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTNET for Linux

Overview

- Software for connecting SIMATIC S7
- Provision of S7 communication via SAPI-S7 interface
- Support of ISO and TCP/IP (RFC 1006) protocol
- Available on Linux operating systems
- Simultaneous operation of several cards



SOFTNET-S7/Linux system configuration

Benefits

- get Designed for Industry
- High-speed communication with the S7 based on the S7 protocol
 - Cost-saving programming thanks to user-friendly and simple interface
 - Flexible in use thanks to hardware-independent software

Application

For Linux systems, Siemens offers high-speed communication with the SIMATIC S7 for Industrial Ethernet based on the S7 protocol.

SAPI-S7 (Simple Application Programmer Interface) provides you with a user-friendly call interface for communication between HMI systems or other Linux applications and the SIMATIC S7.

Function

SOFTNET uses internal standard interfaces of the operating system for accessing the Ethernet connections. This supports the interface cards enabled by the operating system. Simultaneous operation of several cards is possible.

During communication, you can choose between the protocols ISO and TCP/IP with RFC1006 for each connection.

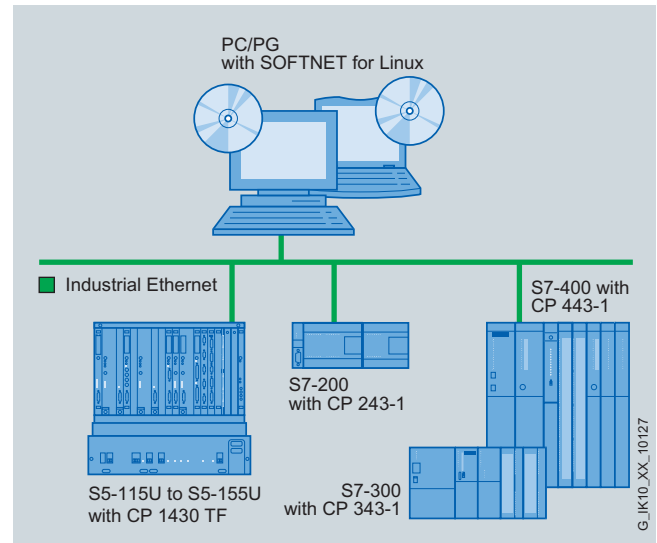
The SOFTNET products offer the user diagnostics and trace functions.

SOFTNET-S7/Linux functions

SIMATIC S7 system components communicate with each other using S7 communication functions. The programming interface SAPI-S7 (Simple Application Programmer Interface) is available for Linux operating systems as well as for the Windows operating systems.

S7 communication offers the following services:

- Administrative services
- Variable services
- BSEND/BRECV



SOFTNET-S7/Linux system configuration

PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTNET for Linux

2

Ordering data

SOFTNET-S7/Linux for Industrial Ethernet

Software for S7 communication for SIMATIC S7 including Level 4 interface over ISO or TCP/IP, single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key by fax, Class A, German/English

Version 2.0

The original distributions of SUSE and RedHat Linux are supported. Please contact your Siemens representative for information about current versions

The original distributions of SUSE and RedHat Linux are supported. Please contact your Siemens representative for information about current versions

Please contact your Siemens contacts for information about the latest versions and their variants (32-bit and 64-bit).

Order No.

2XV9 4501CG00

More information

Support for Linux distributors:
Contact for Sales, Service and Training:
SIEMENS AG
I&S IS E&C IT

Contact
Your IT4Industry Team
Werner-von-Siemens-Str. 60
91052 Erlangen
Tel.: +49 (0)9131/7-4 61 11
Fax: +49 (0)9131/7-4 47 57
E-mail: it4industry@siemens.com

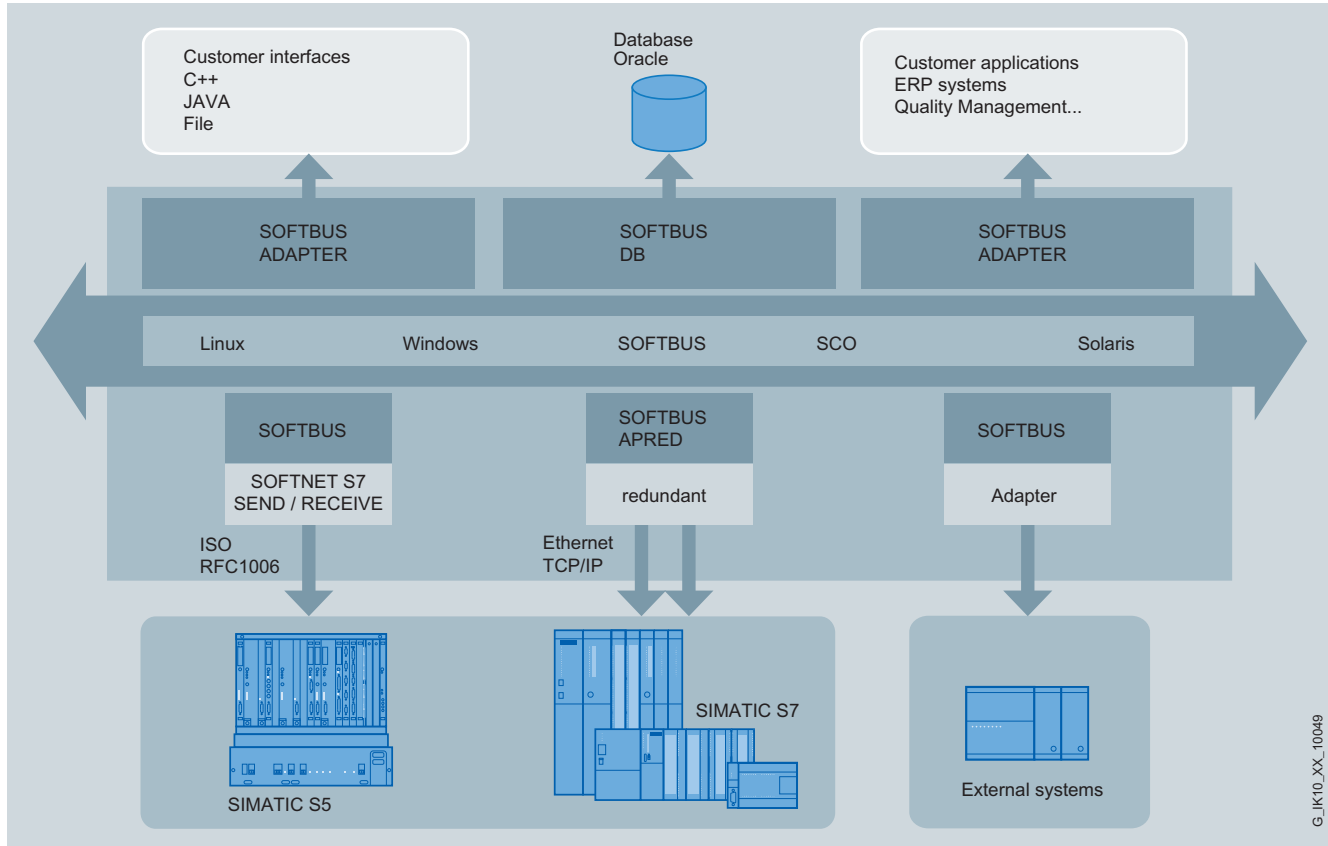
PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTBUS for Linux

Overview

- Integrated communication
- Cross-computer communication
- Uniform interface
 - To databases
 - Link to ERP and DB systems
 - To SIMATIC S7



System configuration for SOFTBUS-SOFTNET

Benefits

- Communication across the system with standardized interface.
- Incorporation of ERP and DB systems.
- Interfacing of SIMATIC control systems
- Fast and automatic data flow

Application

The process landscape in industrial companies is frequently a product of historical developments. Thus there are many isolated solutions that function optimally within their own terms of reference but operate in a vacuum.

Integrating these requires a smooth, loss-free and integrated communication system. Only this guarantees that the right information arrives at the right place and at the right time.

SOFTBUS together with SOFTNET-S7 consists of matched modules that are available on the commonly used system platforms (Linux, Windows) and thus ensure smooth communication between the system platforms.

PROFINET/Industrial Ethernet

System interfacing for PG/PC

SOFTBUS for Linux

Function

SOFTBUS functions

SOFTBUS comprises software modules that can be used on all commonly available computer systems (Windows, Linux).

The modules are compatible and have been adapted to standards such as SIMATIC NET and thus secure vertical integration with short start-up times.

SOFTBUS DB functions

SOFTBUS-DB merges databases and communication and therefore offers possibilities for transaction protection and uniform data storage.

Interfaces

Thanks to the combination of different modules, all commonly used platforms can be supported and linked together heterogeneously or homogeneously.

The programming interface of SOFTBUS is identical to the WVS-KOM interface of the SIPAX package.

This means that SIPAX applications can migrate to SOFTBUS without any problems.

Ordering data

Order No.

SOFTBUS

Version 2.3

SOFTBUS Linux

- SOFTBUS/Linux redundant (TCP) (32 bit)
- SOFTBUS/Linux redundant (ISO) (32 bit)
- SOFTBUS/Linux (TCP) (32 bit)
- SOFTBUS/Linux (ISO) (32 bit)

Please contact your Siemens contacts for information about the latest versions and their variants (32-bit and 64-bit).

2XV9 450-1CG02

2XV9 450-1CG04

2XV9 450-1CG08

2XV9 450-1CG10

More information

Support for Linux distributors:

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E-mail: it4industry@siemens.com

PROFINET/Industrial Ethernet

SIMATIC HMI connection options

Overview

Overview

Communication standard	SIMATIC HMI			WinCC flexible Runtime	Connection via
Version	TP 177B DP/PN OP 177B DP/PN Mobile Panel 177 PN	TP 277 OP 277 Mobile Panel 277 Mobile Panel 277 IWLAN	MP277 MP370 MP 377		

OPC Data Access V2.0 + V1.1 (COM)/V1.0 (XML)

OPC client (COM/DCOM)	—	—	—	●	Industrial Ethernet (s. Catalog IK PI)
OPC server (COM/DCOM)	—	—	—	● ¹⁾	Industrial Ethernet (s. Catalog IK PI)
OPC XML client (SOAP/XML)	—	—	—	● ²⁾	Industrial Ethernet (s. Catalog IK PI)
OPC XML server (SOAP/XML)	—	—	● ³⁾	—	Industrial Ethernet (s. Catalog IK PI)

HTTP communication for variable exchange between SIMATIC HMI systems

HTTP client	● ⁴⁾	● ⁴⁾	● ⁴⁾	● ⁵⁾	Industrial Ethernet (s. Catalog IK PI)
HTTP server	● ⁴⁾	● ⁴⁾	● ⁴⁾	● ⁵⁾	Industrial Ethernet (s. Catalog IK PI)

- System interface possible
- System interface not possible

¹⁾ SIMATIC WinCC flexible/OPC Server for WinCC flexible Runtime required

²⁾ Only with DCOM/XML gateway included in the scope of delivery of WinCC flexible for access to MP277, MP377 and MP 370 OPC XML servers

³⁾ WinCC flexible/OPC Server option for SIMATIC Multi Panel required

⁴⁾ WinCC flexible/Sm@rtAccess option required for SIMATIC Panel

⁵⁾ WinCC flexible/Sm@rtAccess option for WinCC flexible Runtime required

PROFINET/Industrial Ethernet

SIMATIC HMI connection options

SIMATIC S7

Overview

The following types of interface for SIMATIC TP/OP/MP and SIMATIC S7 must be differentiated:

- **PPI (point-to-point interface):**
Connection between SIMATIC TP/OP/MP and SIMATIC S7-200 via PPI. Communication runs on the PPI protocol; a standard FB as with SIMATIC S5 is not required.
- **MPI (multi-point interface):**
Link from SIMATIC TP/OP/MP to SIMATIC S7 via the integrated PPI with S7-200 or MPI with S7-300/-400 or alternatively via the MPI of a separate interface module and the backplane bus to the SIMATIC S7-CPU. Communication runs on the MPI protocol (PG/OP communication); a standard FB as with SIMATIC S5 is not required.
- **PROFIBUS interface:**
Link from SIMATIC TP/OP/MP to SIMATIC S7 via the integrated PROFIBUS interface on the CPU or alternatively via the PROFIBUS interface on a separate interface module and the backplane bus to the SIMATIC S7-CPU. Communication runs on the MPI protocol (PG/OP communication); a standard FB as with SIMATIC S5 is not required.
- **PROFINET interface:**
Link from SIMATIC TP/OP/MP to SIMATIC S7 via the integrated PROFINET interface on the CPU or alternatively via the Industrial Ethernet interface on a separate interface module and the backplane bus to the SIMATIC S7-CPU. Communication runs on the MPI protocol (PG/OP communication); a standard FB as with SIMATIC S5 is not required.

The maximum possible number of S7 connections of one CPU is determined by its power (see Catalog ST 70); from the point of view of SIMATIC TP/OP/MP the following restrictions apply:

- OP 73micro, TP 177micro:
1 connection
- OP 73:
max. 2 connections
- OP 77A, TP 177A, OP 77B, TP177B, OP 177B,
Mobile Panel 177:
max. 4 connections
- TP 277, OP 277; Mobile Panel 277, MP 277, MP 370, MP 377:
max. 6 connections
- PC with WinCC flexible Runtime:
max. 8 connections

PPI

(not for OP73micro, TP 177micro, OP 73, OP 77A, TP 177A, OP 77B, Mobile Panel 177 PN, Mobile Panel 277 IWLAN)

Basically the PPI is a point-to-point connection between a SIMATIC TP/OP/MP (PPI master) or alternatively a PG (PPI master) and an S7-200 (PPI slave).

However, a connection between a SIMATIC TP/OP/MP and/or a PG and an S7-200 (sequential logic point-to-point link, i.e. from the point of view of the S7-200 only one connection is active at any one time) is also possible (network topology: **PPI** only).

MPI/PROFIBUS interface/ Industrial Ethernet interface

The multipoint-capable communication interfaces of SIMATIC TP/OP/MP and SIMATIC S7 are used. Options are:

- Interface between one or a number of TP/OP/MPs (MPI master) and one or a number of S7-300/400s or WinAC (MPI master)
(possible network topology: MPI/PROFIBUS/Industrial Ethernet)
- Interface between one or a number of TP/OP/MPs (MPI master) and one or a number of S7-200s (MPI slave) ¹⁾
(possible network topology: PPI/MPI/PROFIBUS)

Unlike PPI connections, MPI connections are static connections that are set up during booting and then monitored.

A master/slave link has now been added to the original format of a master/master link. This has enabled the integration of the S7-200 (except CPU 212). ¹⁾

Generally this type of information exchange between SIMATIC TP/OP/MP and SIMATIC S7 is independent of the network used, PPI, MPI, PROFIBUS or Industrial Ethernet: SIMATIC TP/OP/MPs are S7 clients and SIMATIC S7-CPU's are S7 servers.

¹⁾ For constraints with regard to transfer rates for the S7-200, see Catalog ST 70.

PROFINET/Industrial Ethernet

SIMATIC HMI connection options

SIMATIC S7

Overview (continued)

Controller Target hardware (PROTOCOL) (physics)	SIMATIC HMI		TP 277 OP 277 Mobile Panel 277 Mobile Panel 277 IWLAN MP 277 MP 377	MP 370	WinCC flexi- ble Runtime	Connection via
	OP 77A TP 177A	OP 77B TP 177B DP OP 177B DP TP 177B DP/PN OP 177B DP/PN Mobile Panel 177 DP Mobile Panel 177 PN				

SIMATIC S7 (PPI/MPI)

via PPI to S7-200 (PPI)	—	● ^{1) 2)}	● ^{1) 2)}	● ¹⁾	● ^{1) 3)}	MPI cable ¹¹⁾
via MPI or PROFIBUS (PG/OP communication) to S7-200	● ⁴⁾	● ^{2) 5)}	● ^{2) 5)}	● ⁵⁾	● ^{3) 5)}	MPI cable ¹¹⁾
via MPI or PROFIBUS (PG/OP communication) to S7-300, -400	● ⁴⁾	● ²⁾	● ²⁾	●	● ³⁾	MPI cable ¹¹⁾
via PPI network (PPI) to max. 1 x S7-200	—	● ^{1) 2)}	● ^{1) 2)}	● ¹⁾	● ^{1) 3)}	PPI network ¹²⁾ (see Catalog ST 70)
via PPI network (PG/OP communication) to max. 4 x S7-200	● ⁴⁾	● ⁶⁾	—	—	—	PPI network ¹²⁾ (see also Catalog ST 70)
via MPI or PROFIBUS network (PG/OP communication) to max. 4 x S7-200	● ⁴⁾	● ^{2) 5)}	● ^{2) 5)}	● ⁵⁾	● ^{3) 5)}	MPI or PROFIBUS network ¹²⁾ (see also Catalog ST 70)
via MPI or PROFIBUS network (PG/OP communication) to max. 4 x S7-300, -400, WinAC	● ⁴⁾	● ²⁾	● ²⁾	●	● ³⁾	MPI or PROFIBUS network ¹²⁾ (see also Catalog ST 70)
via Industrial Ethernet (TCP/IP) (PG/OP communication) to max. 4 x S7-200, -300, -400, WinAC	—	● ^{7) 8)}	● ^{8) 9)}	●	● ¹⁰⁾	Industrial Ethernet (see Chapter 2)

- System interface possible
- System interface not possible

¹⁾ Can be connected via PPI to max. 1 x S7-200 (PPI); network operation (parallel PG, etc.) possible

²⁾ Not Mobile Panel 177 PN, Mobile Panel 277 IWLAN;
connection of Mobile Panel 177 DP, Mobile Panel 277 via special connecting cables and connection box (see Mobile Panel);
see manual for cable assignment

³⁾ Connection via integrated MPI/PROFIBUS interface; use the CP 5611 A2 with a standard PC.

⁴⁾ Max. transfer rate 1.5 Mbit/s

⁵⁾ Only to passive S7-200; OP 77B (MPI) also to active S7-200

⁶⁾ Only OP 77B (MPI)

⁷⁾ Only TP 177B DP/PN, OP 177B DP/PN, Mobile Panel 177 PN

⁸⁾ Mobile Panel 177 PN, Mobile Panel 277 connection via special connecting cable and connection box (see Mobile Panel);
see manual for cable assignment.

⁹⁾ Mobile Panel 277 IWLAN (wireless interface, see Mobile Panel)

¹⁰⁾ Connection via integrated Industrial Ethernet interface; use the CP 1612 with a standard PC

¹¹⁾ MPI cable 6ES7 901-0BF00-0AA0 (max. 187.5 Kbit/s) included in PG's scope of delivery (for download and test purposes only)

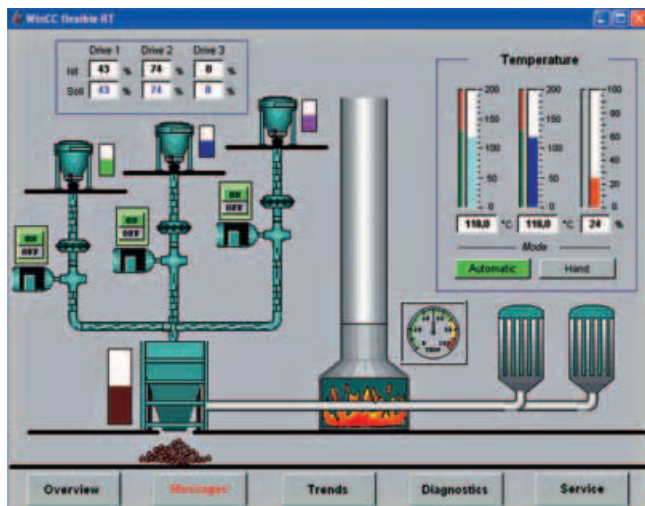
¹²⁾ Bus connector 6GK1 500-0EA02

PROFINET/Industrial Ethernet

SIMATIC HMI connection options

SIMATIC WinCC flexible RT

Overview



- **PC-based visualization software** for single-user systems directly at the machine
- Executable under Windows XP Professional/Vista Business/Vista Ultimate
- **Current version:**
 - SIMATIC WinCC flexible 2008 Runtime with 128, 512, 2048 or 4096 PowerTags
- SIMATIC WinCC flexible Runtime is configured with the SIMATIC WinCC flexible Advanced configuration software.

Benefits

- Optimum price/performance ratio thanks to individually scalable system functionality
- Functions for all visualization tasks: Operator functions, graphical and plot representations, signaling system, log system, archiving (option), recipe management (option), Audit Trail (option), process fault diagnostics (option)
- Flexible runtime functionality thanks to Visual Basic scripts
- Innovative service concepts with remote operation, diagnostics and administration via intranet and Internet as well as e-mail communication to increase availability (option)
- Support for simple distributed automation solutions based on TCP/IP networks at the machine level (option)

Integration

SIMATIC WinCC flexible Runtime supports connection to:

Protocol	PC interfaces
SIMATIC S7 via Ethernet (TCP/IP)	
S7-200 with CP 243-1	CP 1613 A2 1)
S7-300 CPUs with integral Ethernet interface	
S7-300 with CP 343-1	
S7-400 CPUs with integral Ethernet interface	
S7-400 with CP 443-1	
WinAC Basis (V3.0 and higher)	Internal system interface
WinAC RTX	
SIMATIC S7 via integrated interface	
WinAC Basis (V2.0 and higher)	Internal system interface
WinAC RTX	
SIMOTION 2)	Internal system interface
SINUMERIK 3)	
OPC (Client + Server) 4) 5)	1)
Data Access V2.0 + V1.1 (COM) / V1.0 (XML) client only	
HTTP communication for data exchange between SIMATIC HMI (client + server) 5) 6)	1)

1) With MicroBox 420/427 and Panel PC 477/577/677 via internal Ethernet interface

2) For further information, see Catalog PM 10

3) "Sinumerik HMI copy license OA" option required; for further information, see Catalog NC 60

4) OPC client included in scope of delivery, "WinCC flexible/OPC server for WinCC flexible Runtime" required for OPC server option

5) OPC and HTTP communication are additive, i.e. can be used in conjunction with the PLC interfaces listed above

6) The "WinCC flexible/SmartAccess for WinCC flexible Runtime" options are required

Application note

In conjunction with any PLC interface, WinCC flexible Runtime supports the use of the OPC client channel; this enables, for example, the connection to an SNMP OPC server for the purpose of visualizing the data stored there. The SNMP OPC server provides a means of monitoring network components of any type (e. g. switches) which support the SNMP protocol.

Note:

Further information can be found in the Catalog ST 80, in the offline CA 01 Mall and in the Internet at

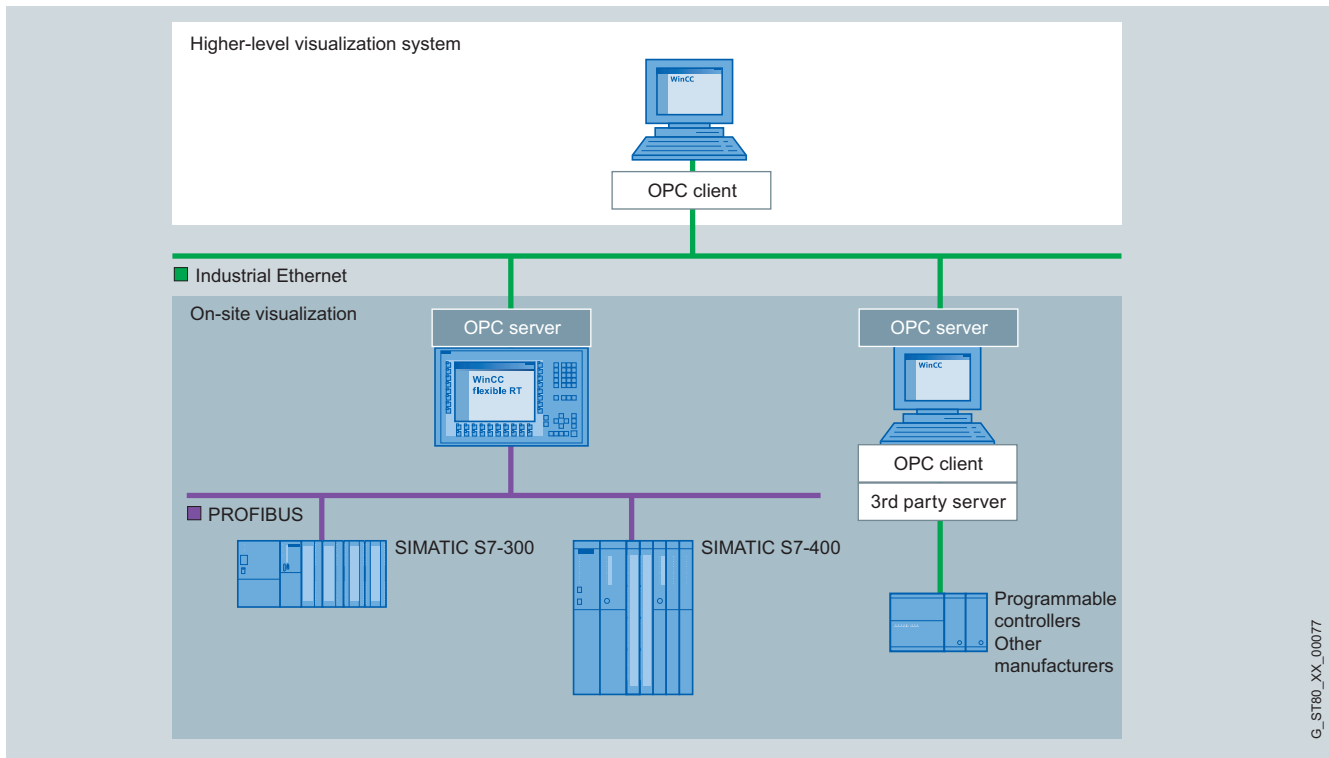
www.siemens.com/automation/mall

PROFINET/Industrial Ethernet

SIMATIC HMI connection options

SIMATIC WinCC flexible RT

Integration (continued)



SIMATIC WinCC flexible Runtime application example

Further information

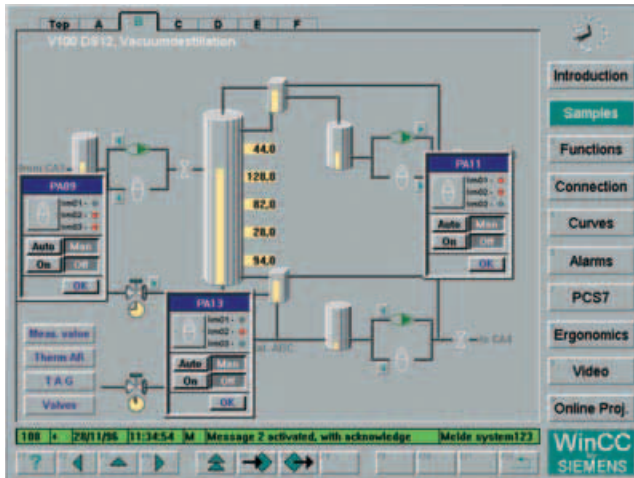
Additional information can be found in the Internet under:
<http://www.siemens.com/wincc-flexible>

PROFINET/Industrial Ethernet

SIMATIC HMI connection options

SIMATIC WinCC

Overview



- PC-based operator control and monitoring system for visualizing and operating processes, production flows, machines and plants in all sectors – with the simple single-user station through to distributed multi-user systems with redundant servers and cross-location solutions with web clients. WinCC is the information hub for company-wide, vertical integration.
- The basic system configuration (WinCC basic software) includes industry-standard functions for signaling and acknowledging events, archiving of messages and measured values, logging of all process and configuration data, user administration and visualization.
- The WinCC basic software forms the core of a wide range of different applications. Based on the open programming interfaces, a wide range of WinCC options (from Siemens A&D) and WinCC add-ons have been developed (by Siemens-internal and external partners).
- WinCC can be operated with every PC that meets the given HW requirements. The product range of the SIMATIC Panel PC and SIMATIC Rack PC is available in particular for the industrial usage of WinCC systems. SIMATIC PCs stand out due to their powerful PC technology, are designed for round-the-clock continuous operation, and can be operated in both harsh industrial environments and office areas.
- Current versions:
 - **SIMATIC WinCC V7.0:**
Executable under
 - Windows VISTA Ultimate, Business and Enterprise
 - Windows XP Professional
 - Windows 2003 Server and Windows 2003 Server R2; the Microsoft SQL Server 2005 SP2 is included
 - **SIMATIC WinCC V6.2 SP2:**
Executable under
 - Windows XP Professional/ Windows Server 2003 SP2/ Windows Server 2003 R2 SP2 and
 - Windows 2000 Professional SP4

Integration

Integration in company-wide solutions (IT and business integration)

WinCC is strictly based on Microsoft technology, which provides for the greatest possible compatibility and integration ability. Active and .net¹⁾ controls allow for technology and sector-specific expansions. Cross-manufacturer communication is also a simply exercise. The reason: WinCC can be used as OPC client and server, and in addition to the access to current process values, it also supports standards such as OPC HDA (Historical Data Access), OPC Alarm & Events and OPC XML Data Access. Equally important: Visual Basic for Applications (VBA) for user-specific expansions of the WinCC Graphics Designer and Visual Basic Scripting (VBS) as an easy-to-learn, open runtime language. If desired, professional application developers can also use ANSI-C. And access to the API programming interfaces is really simple with the Open-Development-Kit ODK.

WinCC integrates an efficient, scalable Historian functionality based on the Microsoft SQL Server 2005 in the basic system. Thus the user is given all possibilities: from high-performance archiving of current process data, to long-term archiving with high data compression, through to a central information turntable in form of a company-wide Process Historian. With the help of the option Central Archive Server, this can be set up in the framework of a WinCC solution. Versatile clients and tools for evaluation, the open interfaces, special options (Connectivity Pack, Connectivity Station, IndustrialDataBridge) form the basis for an effective IT and business integration.

¹⁾ Only supported by WinCC V7.0

Integration in automation solutions

WinCC is an open process visualization system and offers the option of connecting the most diverse control systems.

Released communication software

Only communication software with the listed (or higher) product versions should be used. Corresponding SIMATIC NET upgrades are available for the upgrading of older versions.

Number of connectable controls

For the number of the connectable controls via Industrial Ethernet CP 1613 A2/CP 1623, the following applies for a maximum message frame length of 512 bytes:

Type of connection	Number of nodes
SIMATIC S5 Ethernet Layer 4 + TCP/IP	up to 60
SIMATIC S5 Ethernet TF	up to 60
SIMATIC S7 Protocol Suite	up to 64
SIMATIC 505 Ethernet Layer 4 + TCP/IP	up to 60

Via PROFIBUS, a maximum of 8 controls with CP 5611 A2, CP 5621 and a maximum of 44 controls with CP 5613 A2 can be connected. With approx. 10 or more controls, the usage of Industrial Ethernet is recommended.

Integration (continued)

Mixed mode with different controls

With their multi-protocol stack, the communications processors CP 1613 A2 / CP 1623 und CP 5613 A2 allow for the parallel operation of two protocols, e.g. for the mixed operation of different controls via a bus cable. WinCC supports the operation of two similar Interface Boards only in combination with the channels SIMATIC S5 Ethernet

Layer 4 (2 x CP 1613 A2/CP 1623), SIMATIC S7 Protocol Suite (2 x CP 1613 A2/CP 1623, 2 x CP 5613 A2) and PROFIBUS DP (4 x CP 5613 A2; max. 122 slaves per CP 5613 A2). In addition to communication over industrial Ethernet CP 1613 A2/CP 1623 or PROFIBUS CP 5613 A2, one CP 5611 A2/CP 5621 each can be used for communication with SIMATIC S7 via MPI.

Client-server communication

The communication between the clients and the server is achieved using the TCP/IP protocol. The construction of a separate PC-LAN is recommended. For small projects with correspondingly small message frame advent, a SIMATIC NET Industrial Ethernet can be used for both process communication (WinCC/Server ↔ PLC) and for PC-PC communication (WinCC/client ↔ WinCC/server).

Communication redundancy

WinCC itself does not support any redundant LAN interfaces. The software package S7-REDCONNECT is required for the redundant connection of PCs via 2 x Industrial Ethernet to SIMATIC S7. This connects the SIMATIC S7 with applications on the PC, e.g. SIMATIC WinCC. A pure communication redundancy can be achieved by setting up optical rings (see Catalog IK PI).

Channel DLL PROFIBUS DP

In accordance with the PROFIBUS standard, DP/slaves are always permanently assigned to a DP master; i.e. a second WinCC station (DP/master) cannot access the same controls (DP/slave). This means that redundant operation of two WinCC stations is not possible with the use of the PROFIBUS DP coupling.

Connection to controls from other manufacturers:

For the connection of controls from other manufacturers, OPC (Openness, Productivity & Collaboration) is recommended.

Current notes and information about OPC servers from various suppliers can be found at:

http://www.opcfoundation.org/05_man.asp

WinCC supports the standards:

- OPC Data Access 1.1
- OPC Data Access 2.05a
- OPC Data Access 3.0
- OPC XML Data Access 1.01 (Connectivity Pack/Connectivity Station)
- OPC HDA 1.2 (Connectivity Pack/Connectivity Station)
- OPC A&E 1.1 (Connectivity Pack/Connectivity Station)

More information is available in the Internet at:

<http://www.siemens.com/wincc-connectivity>

Coupling overview

Protocol	Description
SIMATIC S7	
SIMATIC S7 Protocol Suite	Channel DLL for S7 functions via MPI, PROFIBUS or Ethernet Layer 4 + TCP/IP
Cross-manufacturer	
Windows DDE	Channel DLL for DDE communication, WinCC can acquire data from DDE server applications
OPC client ¹⁾	Channel DLL for OPC communication, WinCC can acquire data from OPC server applications
OPC server	Server applications for OPC communication; WinCC provides process data for the OPC client
PROFIBUS FMS	Channel DLL for PROFIBUS FMS
PROFIBUS DP	Channel DLL for PROFIBUS DP

¹⁾ Application note:

The parallel usage of the OPC client channel allows, for example, the connection to an SNMP-OPC server for visualization of the data contained there. The SNMP-OPC server enables monitoring of any network components (e.g. switch) that support the SNMP protocol. Further information can be found in the Catalog IK PI

PROFINET/Industrial Ethernet

SIMATIC HMI connection options

SIMATIC WinCC

Integration (continued)

Communication components for PG/PC for SIMATIC for WinCC V6.2

Industrial Ethernet	SIMATIC S5 Ethernet Layer 4	SIMATIC S5 TCP/IP	SIMATIC S7 Protocol Suite	SIMATIC 505 Ethernet Layer 4	SIMATIC 505 TCP/IP ¹⁾	Order No.
WinCC – channel DLL						
SIMATIC S5 Ethernet TF Channel DLL for S5-TF communication						Included in the basic package
SIMATIC S5 Ethernet Layer 4 Channel DLL for S5 Layer 4 communication + TCP/IP	•	•				Included in the basic package
SIMATIC S7 Protocol Suite Channel DLL for S7 functions			•			Included in the basic package
Communication components for extension of the OS/OP						
SOFTNET-S7 2007²⁾ communications software for S7 functions (max. 64 connections) • for 32-bit Windows XP Prof./Server/Server R2/Vista Ultimate/Business		•	•			6GK1 704-1CW70-3AA0
SOFTNET-S7 Lean 2007^{2) 3)} communications software for S7 functions (max. 8 connections) • for 32-bit Windows XP Prof./Server/Server R2/Vista Ultimate/Business		•	•			6GK1 704-1LW70-3AA0
CP 1613 PCI card for the connection of PG/PC to Industrial Ethernet (communications software must be ordered separately)	•	•	•	•	•	6GK1 161-3AA00
CP 1613 A2 PCI card (32 bit) for connection of PG/PC to Industrial Ethernet (communications software must be ordered separately)	•	•	•	•	•	6GK1 161-3AA01
CP 1623 PCI Express x1 card (3.3 V/12) for connection of PG/PC to Industrial Ethernet (communications software must be ordered separately)	•	•	•	•	•	6GK1 162-3AA00
S7-1613 2007²⁾ communications software for S7 functions and S5/505 Layer 4 communication with TCP/IP • for 32-bit Windows XP Prof./2003 Server/Vista Ultimate/Business	•	•	•	•		6GK1 716-1CB70-3AA0

- System interface possible

¹⁾ Via any interface board with NDIS 3.0 interface; no separate communications software required

²⁾ For upgrade packages, see ordering data

³⁾ SOFTNET-S7 Lean 2006 included in the scope of delivery of WinCC V6.2

You can find further information in the Internet at
<http://www4.ad.siemens.de/view/cs/de/14627901>

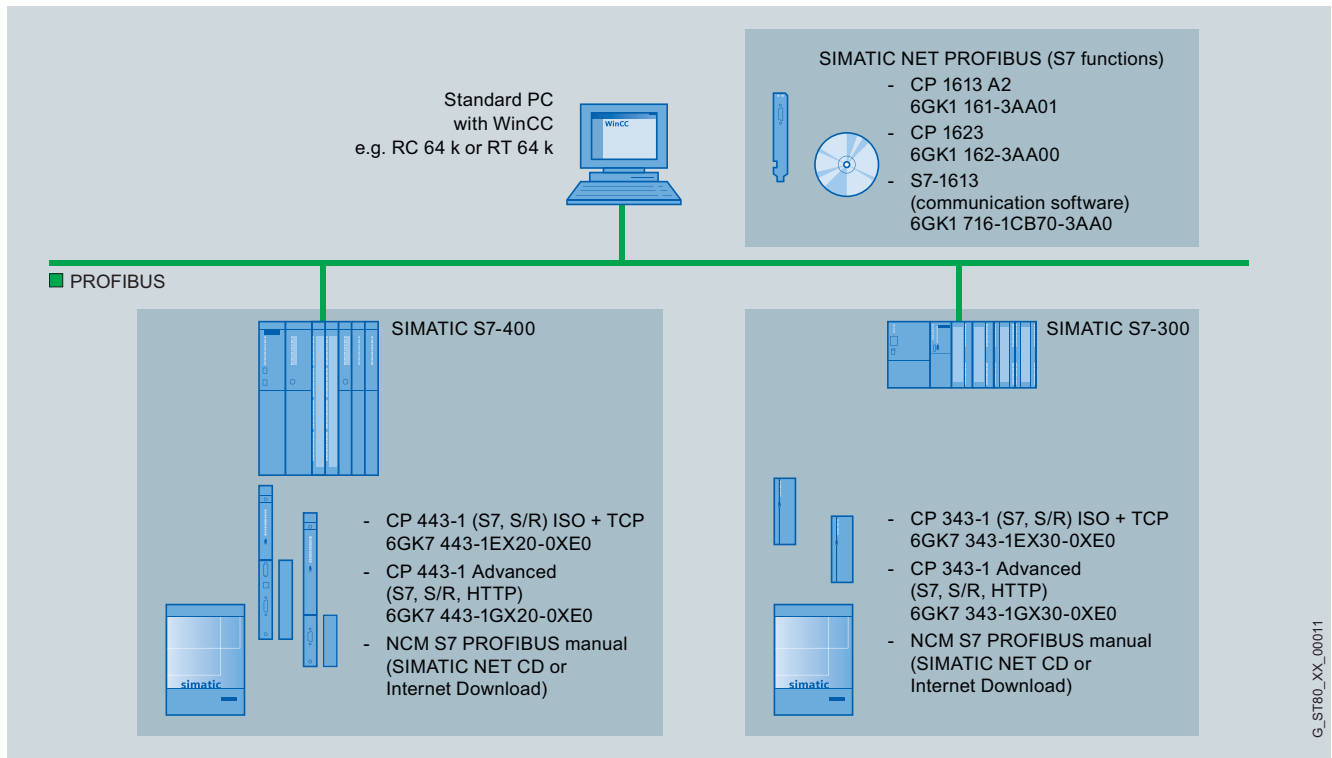
PROFINET/Industrial Ethernet

SIMATIC HMI connection options

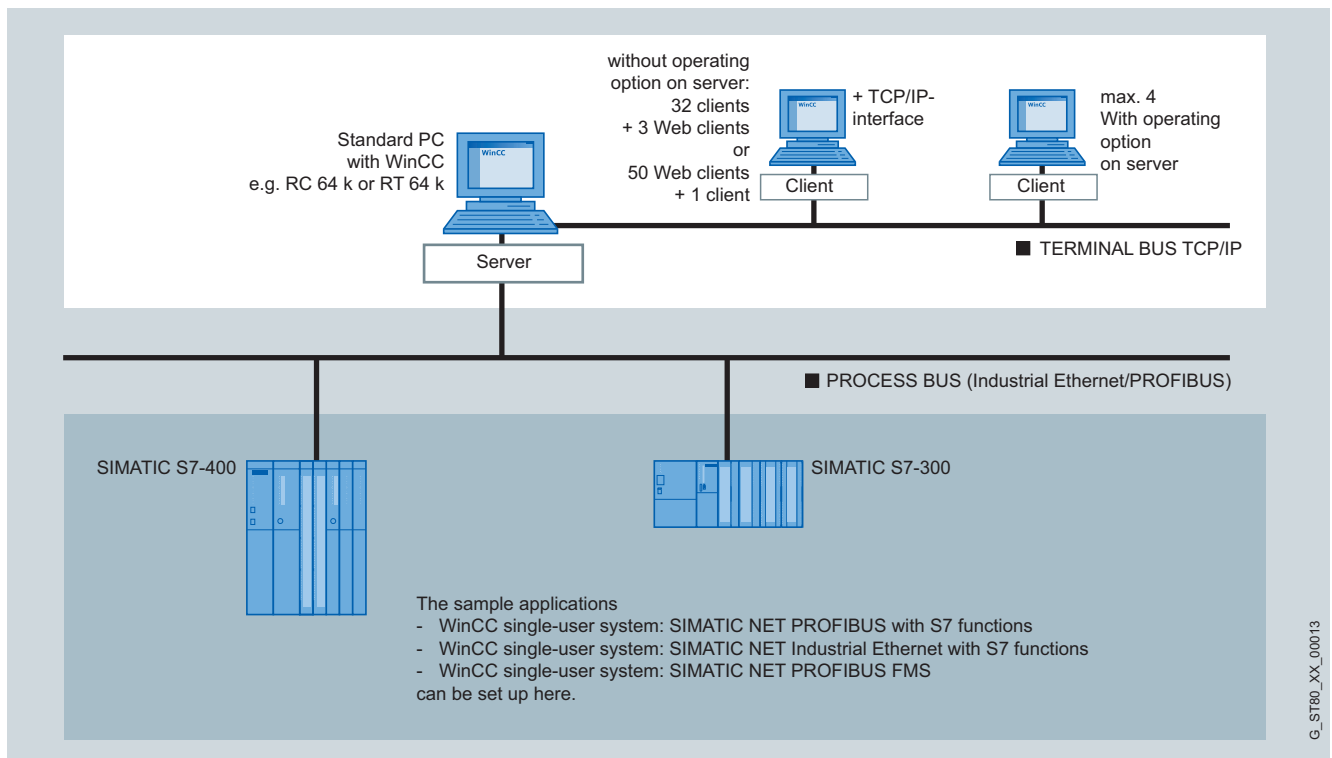
SIMATIC WinCC

Integration (continued)

Communication examples



WinCC single-user system: Industrial Ethernet with S7 communication



WinCC multi-user system with operable server

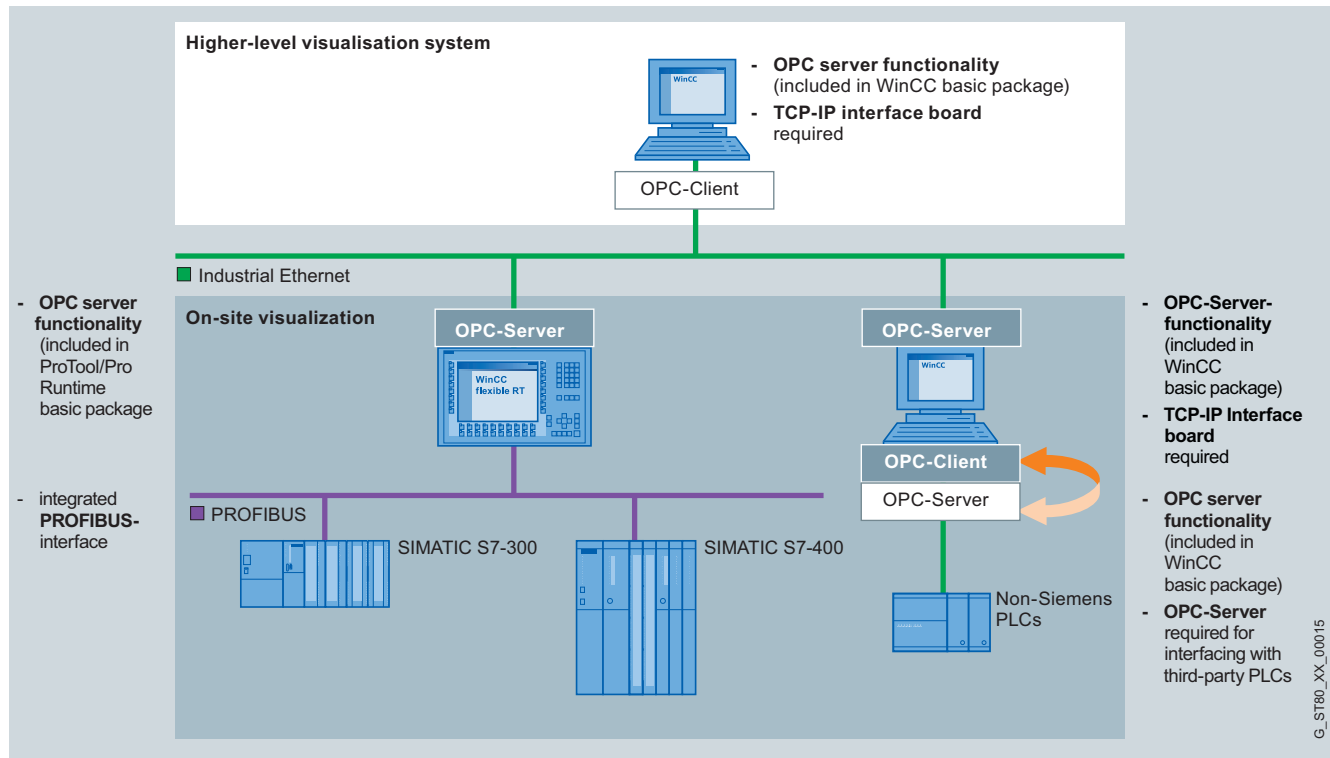
PROFINET/Industrial Ethernet

SIMATIC HMI connection options

SIMATIC WinCC

Integration (continued)

2



OPC coupling

Overview



- Swap media that supports the fast and easy replacement of SIMATIC NET components without a programming device in the event of a fault
- For implementation in all SIMATIC NET products with C-PLUG slot
- For automatic backing up of configuration or engineering data from the SIMATIC NET components
- The C-PLUG can also be used to store application data such as documents or Web pages
- In some SIMATIC S7 CP modules, such as the CP 443-1 Advanced, the C-PLUG is a standard component of the scope of supply and is required to guarantee the complete functional scope of the respective component.

Benefits



- Quick and easy replacement of SIMATIC NET components without the need to reconfigure the replacement part
- The device can be replaced without the need for specially trained personnel or a programming device or PC
- The downtime of network segments and connected Industrial Ethernet stations in the event of a fault is minimized.

Application

The C-PLUG is used when it is necessary for network components or communication modules to be replaced quickly and easily in the event of a fault without the need for reconfiguring the replacement part and without the need for special training.

Design

The C-PLUG is designed to the degree of protection IP20. For IP65 components, the degree of protection is ensured by the construction of the target device. The power supply is also provided by the data terminal.

The C-PLUG is plugged into the appropriate slot in the SIMATIC NET component. During start-up of the device and reconfiguring, the configuration data of the device is backed up automatically.

In the event of component failure, the C-PLUG is simply removed from the failed component and plugged into the replacement part. The replacement unit installed in the network or in the automation system then starts up automatically with the same device configuration as the failed device.

To protect against inadvertent removal (falling out), the slot for the C-PLUG is usually mounted on the rear of the data terminal.



The C-PLUG is plugged into the rear of the CP 443-1 Advanced



The C-PLUG is plugged into the IWLAN Access Point SCALANCE W 788-1PRO on the rear of the device

PROFINET/Industrial Ethernet

Accessories

C-PLUG

Function

During start-up, the device automatically backs up the configuration data on an unwritten C-PLUG (delivery condition) that has been plugged into a SIMATIC NET component. Changes to the configuration during normal operation are also backed up on the C-PLUG without any additional operator intervention.

During start-up an unconfigured device automatically loads the configuration data from an inserted, written C-PLUG provided the data were written by a compatible device type.

Diagnostics

Incorrect C-PLUG handling, such as inserting a C-PLUG that contains the configuration of another device group or general malfunctions of the C-PLUG are signaled over the diagnostic mechanisms for the respective data terminal (LEDs, PROFINET, SNMP, Web-based Management, etc.).

Integration

Supported products

SCALANCE X Industrial Ethernet switches

- X-200
- SCALANCE X-200IRT
- SCALANCE X-300 (included in scope of supply)
- SCALANCE X-400 (included in scope of supply)

Industrial Security SCALANCE S

- S-600

Industrial Wireless LAN SCALANCE W

- W-740
- W-780

System connections for SIMATIC S7

- CP 443-1 Advanced (included in delivery)
- CP 343-1
- CP 343-1 Advanced (included in delivery)

Network transitions

- IWLAN/PB Link PN IO
- IE/PB Link PN IO
- IE/AS-i LINK PN IO
- DP/AS-i LINK Advanced

Technical specifications

Order No.	6GK1 900-0AB00
Product type description	C-PLUG
Power supply	Via data terminal
Power loss	0.015 mW
Mounting	Can be plugged into a C-PLUG slot
Perm. ambient conditions	
• Operating temperature	-20 °C to +70 °C
• Transport/storage temperature	-40 °C to +80 °C
• Relative humidity	max. 95 % (164 ft)
Construction	
• Dimensions (W x H x D) in mm	24.3 x 17 x 8.1
• Weight	Approx. 5 g
Memory capacity	32 MB
Degree of protection	IP20

Ordering data

C-PLUG

Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot

Order No.

6GK1 900-0AB00

PROFINET/Industrial Ethernet

Accessories

SICLOCK time synchronization

Overview



- SICLOCK TC 400 or SICLOCK TM/TS central plant clock as the central component for time synchronization of a plant over Ethernet
- **SICLOCK TC 400;**
 - Four independent Ethernet interfaces for supporting several Ethernet subnets
 - Significantly extended redundancy functions
 - Designed for PROFINET
- GPS or DCF77 radio clocks for direct connection to PCs, SIMATIC S7 controllers and to the SICLOCK TC 400 and SICLOCK TM/TS central plant clocks
- Pulse converter for electrical and optical distribution and interface conversion
- Complete packages for common applications

Application

Time synchronization of all components plays an important part in the automation of production plants. The SICLOCK system is a parameterizable, modular system with perfectly matched components for the time synchronization of plants. GPS (world-wide) as well as DCF77 (Germany) can be used for external radio synchronization

The modular SICLOCK system supports the time synchronization of an individual PLC through to the large plant with multiple redundancy.

Time synchronization concepts

The automation systems and operator stations of a SIMATIC PCS 7 plant or WinCC stations can be synchronized as follows with DCF77 or GPS time signals:

- **Large plants;**
for larger plants with many network stations and stringent requirements for timekeeping, the time synchronization is performed using a SICLOCK TC 400 or SICLOCK TM/TS central plant clock on the plant bus.
- **Small plants;**
for small to medium-sized plants, the PCS 7 Operator Station or the WinCC Station are used as the time master, whereby the corresponding DCF or GPS radio clock is directly connected to the COM interface of the PC.

- Stand-alone systems;
for SIMATIC S7 controllers or small systems, e.g. for laboratory automation, SICLOCK DCF77 is a low-cost alternative to DCF77 synchronization directly over an S7 digital input.

Design

SICLOCK TC 400 and SICLOCK TM/SICLOCK TS are constructed for mounting on a SIMATIC rail. Sets of materials for installation in 19-inch racks are also available.

Function

Central plant clocks

The SICLOCK TC 400 and SICLOCK TM/SICLOCK TS central plant clocks support the synchronization of CPs and PCs with the SIMATIC procedure as well as the NTP procedure over Industrial Ethernet.

SICLOCK TC 400

SICLOCK TC 400 is used as a central plant clock for highly accurate timekeeping and distributes the time to all synchronized systems over Industrial Ethernet, as well as over three additional point-to-point connections with TTY/24 V and RS422/5 V.

The devices are equipped with four independent Ethernet interfaces. This enables separate or redundant automation networks and I&C networks to be synchronized in parallel with just one device. Apart from the well-proven standard networks such as SIMATIC NET or NTP, TC 400 is also prepared for use in PROFINET and PTCP.

Interfaces, signal types, redundancy, etc. are parameterized over the Internet/HMI. The display of statuses on the device provides fast access to the operating status and any faults.

SICLOCK TC 400 has interrupt capability and can be integrated into the I&C.

SICLOCK TM

SICLOCK TM is used as a central plant clock for highly accurate timekeeping and distributes the time to all synchronized systems over Industrial Ethernet, as well as over eight additional outputs for point-to-point connections with RS232, RS422, and TTY 20 mA.

SICLOCK TS

SICLOCK TS is used as a central plant clock for highly accurate timekeeping and distributes the time to all synchronized systems over Industrial Ethernet, as well as over three individually parameterizable outputs for point-to-point connections and IRIG A and B.

If the antenna of a radio clock fails, all SICLOCK central plant clocks continue to provide reliable timekeeping thanks to automatic changeover to highly accurate quartz operation. When the radio clock is returned to service, they accept the time signal without a time step.

PROFINET/Industrial Ethernet

Accessories

SICLOCK time synchronization

Ordering data

Order No.

SICLOCK TC 400 central plant clock

SICLOCK TC 400 preferred packages

SICLOCK TC 400 GPS1000

SICLOCK TC 400 central plant clock with four Ethernet interfaces + GPS1000 radio clock

Package comprises

- SICLOCK TC 400
- SICLOCK GPS1000 system with antenna frame
- Lightning protection for GPS

Complete solution, e.g. for use in PCS 7

2XV9 450-2AR10

SICLOCK TC 400 DCF77

SICLOCK TC 400 central plant clock with four Ethernet interfaces + DCFRS radio clock, industrial version; package comprises

- SICLOCK TC 400
- Active DCF77 antenna with TTY output (20 mA line current) and antenna frame
- Junction box
- 1 m connecting cable mounted, extendable to 1000 m

2XV9 450-2AR20

SICLOCK TC 400 single device

SICLOCK TC 400 central plant clock with four Ethernet interfaces

2XV9 450-2AR01

SICLOCK TM central plant clock

SICLOCK TM DCF77

SICLOCK TM central plant clock with Ethernet interface + DCFRS radio clock, industrial version; package comprises

- SICLOCK TM in stainless steel housing for rail mounting
- Active DCF77 antenna with TTY output (20 mA line current) and antenna frame
- Junction box
- 1 m connecting cable mounted, extendable to 1000 m

2XV9 450-1AR26

2XV9 450-1AR27

SICLOCK TM GPSDEC

SICLOCK TM central plant clock with Ethernet interface + GPS-DEC radio clock, package comprises

- SICLOCK TM in stainless steel housing for rail mounting
- GPS antenna with antenna frame
- 22 m coax antenna cable (max. length 70 m, see accessories)
- GPSDEC decoder with power supply
- 5 m RS232 connection cable
- Parameterization software for PC
- with SICLOCK TM 24 ... 110 V DC
- with SICLOCK TM 90 ... 230 V AC/DC

2XV9 450-1AR24

2XV9 450-1AR25

Order No.

SICLOCK TM central plant clock (continued)

SICLOCK TM GPS1000

SICLOCK TM central plant clock with Ethernet interface + GPS1000 radio clock, package comprises

- SICLOCK TM in stainless steel housing for rail mounting
- GPS1000 antenna head with antenna frame
- GPS1000 power supply
- 5 m RS232 connection cable

- Junction box
- with SICLOCK TM 24 ... 110 V DC

2XV9 450-1AR50

- with SICLOCK TM 90 ... 230 V AC/DC

2XV9 450-1AR51

SICLOCK TM single device

SICLOCK TM central plant clock with Ethernet interface, in stainless steel housing for rail mounting

- SICLOCK TM 24 ... 110 V DC
- with SICLOCK TM 90 ... 230 V AC/DC

2XV9 450-1AR22

2XV9 450-1AR23

SICLOCK TS central plant clock

SICLOCK TS GPS1000

SICLOCK TS central plant clock with Ethernet interface and IRIG A and B + GPS1000 radio clock, package comprises

- SICLOCK TS in stainless steel housing for rail mounting
- GPS1000 radio clock with antenna frame
- Junction box
- with SICLOCK TS 24 ... 110 V DC
- with SICLOCK TS 90 ... 230 V AC/DC

2XV9 450-1AR54

2XV9 450-1AR55

SICLOCK TS single device

SICLOCK TS central plant clock with Ethernet interface and IRIG A and B in stainless steel housing for rail mounting

- SICLOCK TS 24 ... 110 V DC
- SICLOCK TS 90 ... 230 V AC/DC

2XV9 450-1AR52

2XV9 450-1AR53

Ordering data	Order No.	Order No.
DCF radio clocks SICLOCK DCFRS, radio clock, industrial version DCF radio clock for time synchronization of individual PCs or servers in industrial environments with high levels of interference; distances of up to 1000 m are possible between the DCF radio clock and the PC, package comprises <ul style="list-style-type: none"> • Active DCF77 antenna with TTY output (20 mA line current) and antenna frame • TTY/RS232 converter • Plug-in power supply • Two junction boxes • 1 m connecting cable mounted, extendable to 1000 m • DCF77 receiving service for Windows NT/2000/2003/XP 		2XV9 450-1AR21
SICLOCK DCFRS, radio clock for Windows DCF radio clock for the time synchronization of individual PCs over short distances, package comprises <ul style="list-style-type: none"> • Active DCF77 antennas with RS232 interface • Mounting bracket • 20 m connecting cable mounted • DCF77 receiving service for Windows NT/2000/2003/XP 		2XV9 450-1AR14
SICLOCK DCFEMP, receiver with TTY interface DCF receiver for connection to existing HF cable system in the plant for DCF77 time signals for time synchronization of individual PCs or servers at distances of up to 1000 m, package comprises <ul style="list-style-type: none"> • Active DCF77 receiver with mounting bracket and TTY interface • 1 m connecting cable mounted 		2XV9 450-1AR61
SICLOCK DCFS7 Low-cost solution for time synchronization of SIMATIC S7-300/400 over DCF77 over one digital input, package comprises <ul style="list-style-type: none"> • SICLOCK DCFRS, radio clock with RS232 output, 20 m connecting cable and mounting bracket • SICLOCK DCFS7 interface • SICLOCK DCFS7 receiving service (STEP 7 function block for integration in S7 software) 		2XV9 450-1AR36
Accessories for SICLOCK DCFS7 SICLOCK DCFS7 interface + receiving service (STEP 7 function block for integration in S7 software)		2XV9 450-1AR30
SICLOCK DCFS7 interface		2XV9 450-1AR35
SICLOCK DCFS7 receiving service (STEP 7 function block for integration in S7 software)		2XV9 450-1AR32
GPS radio clocks SICLOCK WINGPS, radio clock for Windows GPS radio clock for the time synchronization of individual PCs in industrial environments with high levels of interference, package comprises <ul style="list-style-type: none"> • GPS antenna with antenna frame • WINGPS decoder with power supply • 22 m coax antenna cable (max. length 70 m, see accessories) • 20 m PC connection cable WINGPS • DCF77 receiving service for Windows NT/2000/2003/XP 		2XV9 450-1AR13
SICLOCK GPSDEC, radio clock for Windows GPS radio clock for the time synchronization of the SICLOCK TM/TS central plant clocks or programmable logic controllers in industrial environments with high levels of interference, package comprises <ul style="list-style-type: none"> • GPS antenna with antenna frame • GPSDEC decoder with power supply • 22 m coax antenna cable (max. length 70 m, see accessories) • 5 m RS232 connecting cable • Parameterization program 		2XV9 450-1AR00
GPS1000 + power supply, radio clock for Windows GPS radio clock for the time synchronization of PCs, programmable controllers, as well as the SICLOCK TM and SICLOCK TS central plant clocks in industrial environments with high levels of interference with distances up to 1000 m between the antenna and the device, package comprises <ul style="list-style-type: none"> • GPS1000 antenna head with antenna frame • GPS1000 power supply • Junction box • 5 m RS232 connecting cable • DCF77 receiving service for Windows NT/2000/2003/XP 		2XV9 450-1AR82

PROFINET/Industrial Ethernet

Accessories

SICLOCK time synchronization

Ordering data

Order No.

Accessories

Set of materials for SICLOCK TM/TS

- For desktop housing
- for 19" mounting frame (4 HU)

2XV9 450-1AR80

2XV9 450-1AR81

Lightning protection for antenna cable

- Lightning protection for coaxial antenna cable (SICLOCK GPSDEC/WINGPS)
- Lightning protection for TTY connecting cable (SICLOCK GPS1000/DCFRS industrial version)
- Lightning protection for RS232 antenna cable (SICLOCK DCFS7/DCFRS with RS232 interface)

2XV9 450-1AR11

2XV9 450-1AR83

2XV9 450-1AR15

Coaxial antenna cable SICLOCK GPSDEC/WINGPS

- 30 m
- 70 m

2XV9 450-1AR12

2XV9 450-1AR07

Software

SICLOCK DCF77 receiving service for Windows

2XV9 450-1AR28

SICLOCK Ethernet receiving service for Windows NT

2XV9 450-1AR44

Pulse converter

SICLOCK EOPC

Electrical/optical pulse converter for industrial applications with 32 fiber-optic cable outlets for transparent operation and pulse mode

- SICLOCK EOPC 24 ... 110 V DC
- SICLOCK EOPC 90 ... 230 V AC/DC

2XV9 450-1AR72

2XV9 450-1AR73

SICLOCK PCON

Single-channel electrical/optical pulse converter for industrial applications

- SICLOCK PCON 24 ... 230 V AC/DC, with multi-mode fiberglass connection, 820 nm
- SICLOCK PCON 24 ... 230 V AC/DC, long distance, with multi-mode fiberglass connection, 1310 nm

2XV9 450-1AR63-1SA0

2XV9 450-1AR63-1MA0

SICLOCK DCFHF

HF modulator for DCF77 signals for industrial applications

2XV9 450-1AR64

Displays

SICLOCK DA1000 NET

Digital display with Ethernet connection for date and time

- Red display

2XV9 450-1AR68

SICLOCK DA1000

Digital display for date and time

- Red display
- Green display

2XV9 450-1AR65

2XV9 450-1AR66

More information

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Additional information can be found in the Internet under:

<http://www.siemens.com/siclock>

http://www.siemens-edm.de/siclock_zeitsynchronisation.0.html

PROFINET/Industrial Ethernet

ET 200S distributed I/Os

IM 151-3PN interface modules

Overview



- Interface module for linking the ET 200S to PROFINET
- Handles all data exchange with the PROFINET I/O Controller
- 3 versions:
 - IM151-3 PN STANDARD
 - IM151-3 PN HIGH FEATURE and IM 151-3 PN FO: supports, in contrast to the STANDARD version, the operation of PROFI-safe F modules
 - with integrated 2-port switch for line topology
- Delivery including connecting module

Note:

Micro Memory Card required for operation of the IM 152-3 PN FO.

2

Technical specifications

Order No.	6ES7 151-3AA23-0AB0	6ES7 151-3BA23-0AB0
Product type description	Interfacemodule IM 151-3PN	
Supply voltages		
Supply voltage of electronics 1L+		
• Rated value (DC)	24 V	24 V
• reverse polarity protection	Yes	Yes
Voltages and currents		
Mains/voltage failure jumpering, min.	20 ms	20 ms
Current consumption		
from supply voltage 1L+, max.	250 mA	250 mA
Power loss, typ.	2.5 W	2.5 W
Address area		
Addressing volume		
• Outputs	256 Byte	256 Byte
• Inputs	256 Byte	256 Byte
Connection point		
RJ45	Yes	Yes
Protocols		
PROFINET IO	Yes	Yes
PROFINET IO		
Transmission speed, max.	100 Mbit/s	100 Mbit/s
automatic detection of transmission speed	Yes	Yes
Isochronous mode		
Isochronouos mode	No	No

Order No.	6ES7 151-3AA23-0AB0	6ES7 151-3BA23-0AB0
Product type description	Interfacemodule IM 151-3PN	
Status information/alarms/diagnostics		
Alarms		
• Alarms	Yes	Yes
Diagnoses		
• Diagnostic functions	Yes	Yes
Diagnostics indication LED		
• Bus error BF (red)	Yes	Yes
• Collective error SF (red)	Yes	Yes
• Monitoring 24 V voltage supply ON (green)	Yes	Yes
• Connection to network LINK (green)	Yes	Yes
• Transmit/receive RX/TX (yellow)	Yes	Yes
Isolation		
between backplane bus and electronics	No	No
between Ethernet and electronics	Yes	Yes
between supply voltage and electronics	No	No
General information		
Vendor identification (VendorID)	002AH	002AH
Device identifier (DeviceID)	0301	0301H
Dimensions		
Width	60 mm	60 mm
Height	119.5 mm	119.5 mm
Depth	75 mm	75 mm
Weights		
Weight, approx.	120 g	135 g

PROFINET/Industrial Ethernet

ET 200S distributed I/Os

IM 151-3PN interface modules

2

Ordering data	Order No.	Order No.	
IM 151-3 PN interface module for ET 200S; data transmission rates up to 100 Mbit/s; data volume depends on the number of modules inserted, up to 63 modules can be connected, bus connection through RJ45	6ES7 151-3AA23-0AB0	MMC 128 KB ¹⁾ for storing the device name	6ES7 953-8LG11-0AA0
IM 151-3 PN PROFINET High Feature interface module for ET 200S; data transmission rate up to 100 Mbit/s; max. 63 modules up to 2 m wide can be connected; bus connection via RJ45, incl. terminating module	6ES7 151-3BA23-0AB0	MMC 512 KB ¹⁾ for storing the device name	6ES7 953-8LJ20-0AA0
IM 151-3 FO interface module for ET 200S; with 2 PROFINET FO-interfaces and integrated 2-port switch, max. 63 modules up to 2 m wide can be connected, incl. terminating module	6ES7 151-3BB22-0AB0	MMC 2 MB ¹⁾ for storing the device name and/or firmware update	6ES7 953-8LL20-0AA0
		MMC 4 MB ¹⁾ for storing the device name and/or firmware update	6ES7 953-8LM20-0AA0
		MMC 8 MB ¹⁾ for storing the device name and/or firmware update	6ES7 953-8LP20-0AA0
		ET 200S distributed I/O system manuals are available in the Internet as PDF files:	http://www.siemens.com/simatic-docu
Accessories		SIMATIC Manual Collection Electronic manuals on DVD, multi-language: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication)	6ES7 998-8XC01-8YE0
Industrial Ethernet FC RJ45 Plug 90 RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 90° cable outlet		SIMATIC Manual Collection – Update service for 1 year Scope of delivery: Current DVD "S7 Manual Collection" and the three subsequent updates	6ES7 998-8XC01-8YE2
<ul style="list-style-type: none">• 1 unit• 10 units• 50 units	6GK1 901-1BB20-2AA0 6GK1 901-1BB20-2AB0 6GK1 901-1BB20-2AE0		
Industrial Ethernet FastConnect installation cables Fast Connect standard cable Fast Connect trailing cable Fast Connect marine cable	6XV1 840-2AH10 6XV1 840-3AH10 6XV1 840-4AH10	Label sheets DIN A4 (10 units) Each sheet contains 60 label strips for peripheral modules and 20 label strips for interface modules	6ES7 193-4BH00-0AA0 6ES7 193-4BD00-0AA0 6ES7 193-4BB00-0AA0 6ES7 193-4BA00-0AA0
Termination Kits SC RJ POF Plug Assembly case for on-site assembly of SC RJ plugs consisting of stripping tool, kevlar cutter, microscope, abrasive paper, grinding support	6GK1 900-0ML00-0AA0	<ul style="list-style-type: none">• petrol• red• yellow• light beige	6ES7 193-4JA00-0AA0
IE SC RJ POF Plug Screw-in plug for on-site assembly to POF fiber optic cable (1 pack = 20 units)	6GK1 900-0MB00-0AC0	Terminating module as spare part for ET 200S	
IE SC RJ Refill Set POF Refill set for Termination Kit SC RJ POF Plug, consisting of abrasive paper and grinding plate (set of 5)	6GK1 900-0MN00-0AA0	DIN rail 35 mm	6ES5 710-8MA11 6ES5 710-8MA21 6ES5 710-8MA31 6ES5 710-8MA41
SC RJ POF Plug Assembly case for on-site assembly of SC RJ plugs consisting of stripping tool, buffer stripping tool, kevlar cutter, fiber breaking tool, microscope	6GK1 900-0NL00-0AA0	Industrial Ethernet Switches Managed Industrial Ethernet Switches; Isochronous real time, LED diagnostics, fault signaling contact with SET button, redundant power supply	
Industrial Ethernet SC RJ PCF Plug Screw-in plug for on-site assembly to PCF fiber optic cable (1 pack = 10 units)	6GK1 900-0NB00-0AC0	<ul style="list-style-type: none">• SCALANCE X202-2P IRT; 2 x 10/100 Mbit/s RJ45 ports, 2 x 100 Mbit/s POF/PCF SC RJ• SCALANCE X201-3P IRT; 1 x 10/100 Mbit/s RJ45 ports, 3 x 100 Mbit/s POF/PCF SC RJ• SCALANCE X200-4P IRT; 4 x 100 Mbit/s POF/PCF SC RJ	6GK5 202-2BH00-2BA3 6GK5 201-3BH00-2BA3 6GK5 200-4AH00-2BA3
Industrial Ethernet Fast Connect stripping tool	6GK1 901-1GA00		
MMC 64 KB ¹⁾ for storing the device name	6ES7 953-8LF20-0AA0		

¹⁾ For operating the IM 151-3, an MMC is essential

PROFINET/Industrial Ethernet

ET 200S distributed I/Os

SIPLUS IM 151-3PN interface module (extended temperature range)

Overview



- Interface module for interface to ET 200S PROFINET
- Handles all data exchange with the PROFINET I/O Controller
- IM151-3 PN STANDARD
- With integrated 2-port switch for line topology

Note:

Micro Memory Card required for operation of CPU.

Order No.	6AG1 151-3AA22-2AB0
Order No. based on	6ES7 151-3AA22-0AB0
Product type description	SIPLUS IM 151-3 PN
Ambient temperature range	-25 ... +60 °C; condensation permitted
Environmental conditions	Suited for exceptional medial load (e.g. by chlorine sulfur atmo- sphere).
Technical specifications	The technical specifications are identical with those of the based-on modules.

For further technical documentation on SIPLUS, see:
<http://www.siemens.com/siplus-techdocu>

Ordering data

SIPLUS IM 151-3 PN interface module

(extended temperature range
and medial load)

For ET 200S; transfer rates up to
100 Mbit/s; data volume depends
on the number of modules
inserted, up to 63 modules can
be connected, bus connection
through RJ45

Accessories

Order No.

6AG1 151-3AA22-2AB0

see IM 151-3PN ordering data

PROFINET/Industrial Ethernet

ET 200S distributed I/Os – Interface modules with integrated CPU

IM 151-8 PN/DP CPU interface module

Overview



- Interface module for SIMATIC ET 200S with integrated CPU S7-314
- For high-performance control solutions in ET 200S
- Increase of the availability of systems and machines
- PROFINET IO-Controller for up to 128 IO-Devices
- PROFINET interface with integrated 3-port switch
- With many communication options: PG/OP communication, PROFINET IO, PROFINET CBA, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7-communication (with loadable FBs)
- Fast, simple and end-to-end programming of a system with modular programs via STEP 7
- Compact SIMATIC Micro Memory Card (MMC)
- Optional PROFIBUS master for 32 PROFIBUS DP slaves (with master interface 6ES7 138-4HA00-0AB0)
- Fail-safe IM 151-8F PN/DP CPU PROFIsafe available

Note:
SIMATIC Micro Memory Card required for operation of CPU.

Ordering data	Order-No.
IM 151-8 PN/DP CPU interface module (128 K)	6ES7 151-8AB00-0AB0
IM 151-8F PN/DP CPU interface module (192 K)	6ES7 151-8FB00-0AB0
Including termination module	
Accessories	
MMC 64 KB ¹⁾	6ES7 953-8LF20-0AA0
for program backup	
MMC 128 KB ¹⁾	6ES7 953-8LG11-0AA0
for program backup	
MMC 512 KB ¹⁾	6ES7 953-8LJ20-0AA0
for program backup	
MMC 2 MB ¹⁾	6ES7 953-8LL20-0AA0
for program backup and/or firmware update	
MMC 4 MB ¹⁾	6ES7 953-8LM20-0AA0
for program backup	
MMC 8 MB ¹⁾	6ES7 953-8LP20-0AA0
for program backup	
External prommer	6ES7 792-0AA00-0XA0
for MMC, among others, with USB interface	
PG	On request
with integrated MMC interface	
Label sheets DIN A4 (10 units)	
Each sheet contains 60 labeling strips for peripheral modules and 20 labeling strips for interface modules	
• petrol	6ES7 193-4BH00-0AA0
• red	6ES7 193-4BD00-0AA0
• yellow	6ES7 193-4BB00-0AA0
• light beige	6ES7 193-4BA00-0AA0

Accessories (continued)

ET 200S distributed I/O system manuals

are available in the Internet as PDF files:

www.siemens.com/simatic-docu

Termination module

as spare part for ET 200S

6ES7 193-4JA00-0AA0

SIMATIC S5, 35 mm DIN rail

- Length: 483 mm for 19" cabinets
- Length: 530 mm for 600 mm cabinets
- Length: 830 mm for 900 mm cabinets
- Length: 2 m

6ES5 710-8MA11

6ES5 710-8MA21

6ES5 710-8MA31

6ES5 710-8MA41

Industrial Ethernet FC RJ45 Plug 180

RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 90° cable

- 1 unit
- 10 units
- 50 units

6GK1 901-1BB10-2AA0

6GK1 901-1BB10-2AB0

6GK1 901-1BB10-2AE0

Industrial Ethernet FastConnect Installation cables

- FastConnect Standard Cable
- FastConnect Trailing Cable
- FastConnect Marine Cable

6XV1 840-2AH10

6XV1 840-3AH10

6XV1 840-4AH10

Industrial Ethernet FastConnect Stripping Tool

6GK1 901-1GA00

¹⁾ An MMC is essential to operate the CPU

PROFINET/Industrial Ethernet

ET 200S distributed I/Os – Interface modules with integrated CPU

IM 151-8F PN/DP CPU interface module

Overview



Note:
SIMATIC Micro Memory Card required for operation of CPU.

- Interface module for SIMATIC ET 200S with integrated fail-safe CPU
- For constructing a fail-safe automation system for plants with increased safety requirements
- Complies with safety requirements up to SIL 3 according to IEC 61508, IEC 62061, up to PLe according to ISO 13849-1:2006 and Cat. 4 according to EN 954-1
- For high-performance control solutions in ET 200S
- Increase of the availability of systems and machines
- PROFINET IO-Controller for up to 128 IO-Devices
- PROFINET interface with integrated 3-port switch
- With many communication options:
PG/OP communication, PROFINET IO, PROFINET CBA, open IE communication (TCP, ISO-on-TCP and UDP), web server and S7-communication (with loadable FBs)
- Fast, simple and end-to-end programming of a system with modular programs via STEP 7
- Compact SIMATIC Micro Memory Card (MMC)
- Optional PROFIBUS master for 32 PROFIBUS DP slaves (with master interface 6ES7138-4HA00-0AB0)

2

Ordering data	Order-No.		Order No.
IM 151-8F PN/DP CPU interface module (192 K) Including termination module	6ES7 151-8FB00-0AB0	Label sheets DIN A4 (10 units) Each sheet contains 60 labeling strips for peripheral modules and 20 labeling strips for interface modules	
Distributed Safety V5.4 programming tool <i>Task:</i> Software for configuring fail-safe application programs for SIMATIC S7-300F, S7-400F, ET 200S <i>Requirement:</i> STEP 7 V5.3 SP3 and higher		<ul style="list-style-type: none"> • petrol • red • yellow • light beige 	6ES7 193-4BH00-0AA0 6ES7 193-4BD00-0AA0 6ES7 193-4BB00-0AA0 6ES7 193-4BA00-0AA0
<ul style="list-style-type: none"> • Floating License • Software Update Service 	6ES7 833-1FC02-0YA5 6ES7 833-1FC00-0YX2	ET 200S distributed I/O system manuals are available in the Internet as PDF files:	www.siemens.com/simatic-docu
Distributed Safety Upgrade From V5.3 to V5.4; Floating license for 1 user	6ES7 833-1FC02-0YE5	Termination module as spare part for ET 200S	6ES7 193-4JA00-0AA0
Accessories		SIMATIC S5, 35 mm DIN rail	
MMC 64 KB ¹⁾ for program backup	6ES7 953-8LF20-0AA0	<ul style="list-style-type: none"> • Length: 483 mm for 19" cabinets • Length: 530 mm for 600 mm cabinets • Length: 830 mm for 900 mm cabinets • Length: 2 m 	6ES5 710-8MA11 6ES5 710-8MA21 6ES5 710-8MA31 6ES5 710-8MA41
MMC KB¹⁾ for program backup	6ES7 953-8LG11-0AA0	Industrial Ethernet FC RJ45 Plug 180 RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 90° cable	
MMC 512 KB ¹⁾ for program backup	6ES7 953-8LJ20-0AA0	<ul style="list-style-type: none"> • 1 unit • 10 units • 50 units 	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0
MMC 2 MB ¹⁾ for program backup and/or firmware update	6ES7 953-8LL20-0AA0	Industrial Ethernet FastConnect Installation cables	
MMC 4 MB ¹⁾ for program backup	6ES7 953-8LM20-0AA0	<ul style="list-style-type: none"> • FastConnect Standard Cable • FastConnect Trailing Cable • FastConnect Marine Cable 	6XV1 840-2AH10 6XV1 840-3AH10 6XV1 840-4AH10
MMC 8 MB ¹⁾ for program backup	6ES7 953-8LP20-0AA0	Industrial Ethernet FastConnect Stripping Tool	6GK1 901-1GA00
External prommer for MMC, among others, with USB interface	6ES7 792-0AA00-0XA0		
PG with integrated MMC interface	On request		

¹⁾ An MMC is essential to operate the CPU

PROFINET/Industrial Ethernet

ET 200pro distributed I/O

IM 154-4 PN interface modules

Overview



Interface module for processing the communication between ET 200pro and a higher-level controller over PROFINET IO.

Technical specifications

Order No.	6ES7 154-4AB10-0AB0
Product type description	IM 154-4 PN interface modules
Supply voltages	
Supply voltage of electronics 1L+	
• Rated value (DC)	24 V
• Short-circuit protection	Yes; Fuse in lower part is exchangeable, the fuse on the IM-LP is not
• reverse polarity protection	Yes; against destruction
Rated value	
• DC 24 V	Yes
• permissible range, lower limit (DC)	20.4 V; Unit [V]
• permissible range, upper limit (DC)	28.8 V; Unit [V]
Current consumption	
from supply voltage 1L+, max.	400 mA; Dependent on terminal module, typ. maximum value for FO connection method, full load on RWB and 20.4 V input voltage
Power loss, typ.	6 W; Dependent on terminal module, typ. maximum value for CU connection method, full load on RWB, for FO the value is approx. 0.7 W higher
Memory	
Type of storage	
• Micro Memory Card	No
Address area	
Addressing volume	
• Outputs	256 Byte
• Inputs	256 Byte
Protocols	
PROFINET IO	Yes
PROFINET IO	
Transmission speed, max.	100 MBit/s
automatic detection of transmission speed	Yes
Services	ARP, PING, SNMP
Isochronous mode	
Isochronous mode	No
equidistance	No
shortest clock pulse	0.25 ms

Order No.	6ES7 154-4AB10-0AB0
Product type description	IM 154-4 PN interface modules
Status information/alarms/diagnostics	
Diagnostics indication LED	
• Bus error BF (red)	Yes; Additional LEDs (MAINT, P1/2 LINK, P1/2 RX/TX) available
• Collective error SF (red)	Yes
• Monitoring 24 V voltage supply ON (green)	Yes
• Load voltage monitoring DC 24 V (green)	Yes
Isolation	
Isolation checked with	500 VDC
Isolation	
between backplane bus and electronics	No
between supply voltage and electronics	Yes
Environmental requirements	
Operating temperature	
• min.	-25 °C
• max.	55 °C
Storage/transport temperature	
• min.	-40 °C
• max.	70 °C
Degree and class of protection	
• IP 65	Yes
• IP 66	Yes
• IP 67	Yes
General information	
Vendor identification (VendorID)	0x002A
Device identifier (DeviceID)	0x0305
Dimensions	
Dimensions	
Width	90 mm
Height	130 mm
Depth	59.3 mm
Weights	
Weight, approx.	490 g

PROFINET/Industrial Ethernet

ET 200pro distributed I/O

IM 154-4 PN interface modules

Ordering data	Order No.	Order No.
IM 154-4 PN High Feature interface module for communication between ET 200pro and higher-level controllers over PROFINET IO; support of PROFIsafe	6ES7 154-4AB10-0AB0	
Accessories		Accessories (continued)
CM IM PN connection module M12, 7/8" for connecting PROFINET PN and 24 V power supply to PROFINET interface modules, 2 x M12 and 2 x 7/8"	6ES7 194-4AJ00-0AA0	7/8" connecting cable to power supply 5-core, 5 x 1.5 mm ² , trailing type, pre-assembled with two 7/8" connectors, 5-pin, up to 50 m <ul style="list-style-type: none"> • 1.5 m long • 2.0 m long • 3.0 m long • 5.0 m long • 10 m long • 15 m long • Other special lengths with 90° or 180° cable outlet
CM IM PN connection module 2xRJ45 for connecting PROFINET PN and 24 V power supply to PROFINET interface modules, 2 x RJ45 and 2 x push-pull power connector	6ES7 194-4AF00-0AA0	see http://support.automation.siemens.com/WW/view/en/26999294
CM IM PN 2xSCRJ FO connection module for connecting PROFINET PN and 24 V power supply to PROFINET interface modules, 2 x SCRJ FO and 2 x push-pull power connector	6ES7 194-4AG00-0AA0	Power line 5-core, 5 x 1.5 mm ² , trailing type, sold by the meter, minimum order quantity 20 m, maximum order quantity 1,000 m
M12 sealing cap for protection of unused M12 connections with ET 200pro	3RX9 802-0AA00	7/8" cable connector for ET 200eco, with axial cable outlet <ul style="list-style-type: none"> • with male insert, 5 per pack • with female insert, 5 per pack
IE M12 connecting cables Pre-assembled, with two M12 connectors, up to 85 m <ul style="list-style-type: none"> • 0.3 m long • 0.5 m long • 1.0 m long • 1.5 m long • 2.0 m long • 3.0 m long • 5.0 m long • 10 m long • 15 m long • Other special lengths with 90° or 180° cable outlet 	6XV1 870-8AE30 6XV1 870-8AE50 6XV1 870-8AH10 6XV1 870-8AH15 6XV1 870-8AH20 6XV1 870-8AH30 6XV1 870-8AH50 6XV1 870-8AN10 6XV1 870-8AN15 see http://support.automation.siemens.com/WW/view/en/26999294	7/8" Power T-Tap Power T-piece with two 7/8" female inserts and one 7/8" male insert, 5 per pack
		Industrial Ethernet FastConnect installation cables <ul style="list-style-type: none"> • IE FC TP Standard Cable GP 2 x 2; Sold by the meter, max. order quantity 1000 m; Minimum order quantity 20 m • IE FC TP Trailing Cable 2 x 2; Sold by the meter, max. order quantity 1000 m; Minimum order quantity 20 m • IE FC TP Trailing Cable GP 2 x 2; Sold by the meter, max. order quantity 1000 m; Minimum order quantity 20 m • IE TP Torsion Cable GP 2 x 2; Sold by the meter, max. order quantity 1000 m; Minimum order quantity 20 m • IE FC TP Marine Cable 2 x 2; Sold by the meter, max. order quantity 1000 m; Minimum order quantity 20 m
		6XV1 822-5BH15 6XV1 822-5BH20 6XV1 822-5BH30 6XV1 822-5BH50 6XV1 822-5BN10 6XV1 822-5BN15
		6XV1 830-8AH10
		6GK1 905-0FA00 6GK1 905-0FB00
		6GK1 905-0FC00
		6XV1 840-2AH10 6XV1 840-3AH10 6XV1 870-2D 6XV1 870-2F 6XV1 840-4AH10

PROFINET/Industrial Ethernet

ET 200pro distributed I/O

IM 154-4 PN interface modules

2

Ordering data

Order No.

Accessories (continued)

IE RJ45 Plug PRO

RJ45 plug in IP65/67-rated design for on-site assembly, plastic housing, insulation/displacement connection system, for SCALANCE X-200IRT PRO and ET200pro:
1 pack = 1 unit

6GK1901-1BB10-6AA0

IE SC RJ POF Plug PRO

SC RJ plug for POF fibers in IP65/67-rated design for on-site assembly, plastic housing, for SCALANCE X-200IRT PRO and ET200pro
1 pack = 1 unit

6GK1900-0MB00-6AA0

IE SC RJ PCF Plug PRO

SC RJ plug for PCF fibers in IP65/67-rated design for on-site assembly, plastic housing, for SCALANCE X-200IRT PRO
1 pack = 1 unit

6GK1900-0NB00-6AA0

Power Plug PRO

5-pole power plug for 2 x 24 V power supply in IP65/67-rated design, for on-site assembly, plastic housing, for SCALANCE X-200IRT and ET200 pro
1 pack = 1 unit

6GK1907-0AB10-6AA0

IE M12 Plug PRO

M12 plug for on-site assembly; (D-coded), metal housing, fast connect system, for SCALANCE X208PRO and IM 154-4 PN

- 1 unit
- 8 units

6GK1 901-0DB10-6AA0
6GK1 901-0DB10-6AA8

IE panel feedthrough

Control cabinet feedthrough for converting M12 D-coded connection system (IP65) to RJ45 connection system (IP20)

- 1 pack = 5 units

6GK1 901-0DM20-2AA5

Order No.

General accessories

ET 200pro rack

- Narrow, for interface, electronics and power modules
 - 500 mm
 - 1000 mm
 - 2000 mm, can be cut to length
- Compact, for interface, electronics and power modules
 - 500 mm
 - 1000 mm
 - 2000 mm, can be cut to length
- Wide, for interface, electronics, power modules and motor starters
 - 500 mm
 - 1000 mm
 - 2000 mm, can be cut to length
- Wide, for I/O modules and motor starters
 - 500 mm
 - 1000 mm
 - 2000 mm

6ES7 194-4GA00-0AA0
6ES7 194-4GA60-0AA0
6ES7 194-4GA20-0AA0

6ES7 194-4GC70-0AA0
6ES7 194-4GC60-0AA0
6ES7 194-4GC20-0AA0

6ES7 194-4GB00-0AA0
6ES7 194-4GB60-0AA0
6ES7 194-4GB20-0AA0

6ES7 194-4GD00-0AA0
6ES7 194-4GD10-0AA0
6ES7 194-4GD20-0AA0

Spare fuse

12.5 A quick-response, for interface and power modules, 10 items per package unit

6ES7 194-4HB00-0AA0

SIMATIC Manual Collection

Electronic manuals on DVD, multi-language:
S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication)

6ES7 998-8XC01-8YE0

SIMATIC Manual Collection – Update service for 1 year

Scope of delivery: Current DVD "S7 Manual Collection" and the three subsequent updates

6ES7 998-8XC01-8YE2

PROFINET/Industrial Ethernet

ET 200pro distributed I/O

IM 154-8 PN/DP CPU interface modules

Overview



- PROFINET IO Controller to operate distributed I/Os on PROFINET
- Component Based Automation (CBA) on PROFINET
- PROFINET proxy for intelligent devices on PROFIBUS DP in Component Based Automation (CBA)
- CPU with PLC functionality equivalent to S7-315-2 PN/DP, provides distributed intelligence for preprocessing
- Interface module to exchange preprocessed I/O data from ET 200pro with a higher-level master through PROFIBUS DP
- Fast, simple and end-to-end programming of a system with modular programs via STEP 7

Micro Memory Card required for operation of CPU.

2

Technical specifications

Order No.	6ES7 154-8AB00-0AB0
Product type description	IM 154-8 PN/DP CPU interface modules
Product status	
associated programming package	STEP 7 V5.4 SP1 with HW update
Supply voltages	
Rated value	
• DC 24 V	Yes
• permissible range, lower limit (DC)	20.4 V
• permissible range, upper limit (DC)	28.8 V
Voltages and currents	
external protection for supply cables (recommendation)	MCB 24V DC / 16A with tripping characteristic Type B and C (see ET 200pro manual)
Current consumption	
Inrush current, typ.	2 A; Typical
I^2t	0.04 A ² s; Typical
Current consumption (in no-load operation), typ.	200 mA
Current consumption (rated value)	350 mA; Typical
Power loss, typ.	8.5 W; Typical
Memory	
Type of storage	
• RAM	
- integrated	256 KByte
- expandable	No
• Load memory	
- pluggable (MMC)	Yes
- pluggable (MMC), max.	8 MByte
Backup	
• present	Yes
• without battery	Yes
CPU/blocks	
DB	
• Number, max.	1 023; Number band: 1 to 1023
• Size, max.	16 KByte

Order No.	6ES7 154-8AB00-0AB0
Product type description	IM 154-8 PN/DP CPU interface modules
FB	
• Number, max.	1 024; Sequence of numbers: 0 to 2047
• Size, max.	16 KByte
FC	
• Number, max.	1 024; Sequence of numbers: 0 to 2047
• Size, max.	16 KByte
OB	
• Size, max.	16 KByte
Nesting depth	
• per priority class	8
• additional within an error OB	4
CPU/processing times	
for bit operations, min.	0.1 µs
for word operations, min.	0.2 µs
for fixed point arithmetic, min.	2 µs
for floating point arithmetic, min.	3 µs
Times/counters and their remanence	
S7 counter	
• Number	256
• of which remanent without battery	
- adjustable	Yes
- lower limit	0
- upper limit	255
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	255
• Counting range	
- adjustable	Yes
- lower limit	0
- upper limit	999

PROFINET/Industrial Ethernet

ET 200pro distributed I/O

IM 154-8 PN/DP CPU interface modules

Technical specifications (continued)

Order No.	6ES7 154-8AB00-0AB0
Product type description	IM 154-8 PN/DP CPU interface modules
IEC counter	
• present	Yes
• Type	SFB
S7 times	
• Number	256
• Remanence	
- adjustable	Yes
- lower limit	0
- upper limit	128
- preset	No retentivity
• Time range	
- lower limit	10 ms
- upper limit	9 990 s
IEC timer	
• present	Yes
• Type	SFB
Data areas and their remanence	
Flag	
• Number, max.	2 048 Byte
• Remanence available	Yes; MB 0 to MB 2047
• Number of clock memories	8
Data blocks	
• Number, max.	1 023; From DB 1 to DB 1023
• Size, max.	16 KByte
• Remanence adjustable	Yes; From DB 1 to DB 1023
• Remanence preset	yes
Local data	
• per priority class, max.	1 024 Byte; per block max. 510
Address area	
I/O address area	
• Inputs	2 048 Byte
• Outputs	2 048 Byte
• of which, distributed	
- Inputs	2 048 Byte
- Outputs	2 048 Byte
Process image	
• Inputs, adjustable	2 048 Byte
• Outputs, adjustable	2 048 Byte
• Inputs, preset	128 Byte
• Outputs, preset	128 Byte
Subprocess images	
• Number of subprocess images, max.	1
Digital channels	
• Inputs	16 384
• Outputs	16 384
• Inputs, of which central	128
• Outputs, of which central	64

Order No.	6ES7 154-8AB00-0AB0
Product type description	IM 154-8 PN/DP CPU interface modules
Analog channels	
• Inputs	1 024
• Outputs	1 024
• Inputs, of which central	64
• Outputs, of which central	64
Hardware config.	
Racks, max.	1
Modules per rack, max.	16; Expansion width max. 1m
Number of DP masters	
• integrated	1
Time	
Clock	
• Hardware clock (real-time clock)	Yes
• buffered and synchronizable	Yes; On MPI: master/slave; to DP: when operated as DP master: master/slave; to PROFINET: Via NTP (client only)
• Deviation per day, max.	10 s
Operating hours counter	
• Number	1
• Range of values	2 to the power of 31 hours (when using the SFC 101)
• Granularity	1 h
• remanent	Yes; must be restarted at each warm restart
Clock synchronization	
• supports	Yes
• to MPI, Master	Yes
• to MPI, Slave	Yes
• in AS, Master	No
• in AS, Slave	No
• on Ethernet via NTP	Yes
S7 message functions	
Number of login stations for message functions, max.	16
Process diagnostic messages	Yes
simultaneously active Alarm-S blocks, max.	40
Test commissioning functions	
Status/control	
• Status/control variable	Yes
• Variables	Inputs, outputs, memory bits, DB, times, counters
• Number of variables, max.	30
• of which status variable, max.	30
• of which control variable, max.	14
Forcing	
• Forcing	Yes
• Force, variables	I/O
• Number of variables, max.	10

PROFINET/Industrial Ethernet

ET 200pro distributed I/O

IM 154-8 PN/DP CPU interface modules

2

Technical specifications (continued)

Order No.	6ES7 154-8AB00-0AB0
Product type description	IM 154-8 PN/DP CPU interface modules
Status block	Yes
Single step	Yes
Number of breakpoints	2
Diagnostic buffer	
• present	Yes
• Number of entries, max.	500
• adjustable	No
Communication functions	
PG/OP communication	Yes
Routing	Yes
Global data communication	
• supported	Yes
• Size of GD packets, max.	22 Byte
S7 basic communication	
• supported	Yes
S7 communication	
• supported	Yes
Open IE communication	
• TCP/IP	Yes
- Number of connections, max.	8
- Data length, max.	8 KByte
• ISO-on-TCP (RFC1006)	Yes
- Number of connections, max.	8
- Data length, max.	8 KByte
• UDP	Yes
- Number of connections, max.	8
- Data length, max.	1 472 KByte
Number of connections	
• overall	16
• usable for PG communication	15
• usable for OP communication	15
• usable for S7 basic communication	14
PROFINET CBA (at set setpoint communication load)	
• Setpoint for the CPU communication load	50%
• Number of remote interconnection partners	32
• Number of functions, master/slave	30
• Total of all master/slave connections	1 000
• Data length of all incoming connections master/slave, max.	4 000 Byte
• Data length of all outgoing connections master/slave, max.	4 000 Byte
• Number of device-internal and PROFIBUS interconnections	500
• Data length of device-internal and PROFIBUS interconnections, max.	4 000 Byte
• Data length per connection, max.	1 400 Byte

Order No.	6ES7 154-8AB00-0AB0
Product type description	IM 154-8 PN/DP CPU interface modules
• Remote interconnections with acyclic transmission	
- Sampling frequency: sampling interval, min.	500 ms
- Number of incoming interconnections	100
- Number of outgoing interconnections	100
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	1 400 Byte
• Remote interconnections with cyclic transmission	
- Transmission frequency: transmission interval, min.	1 ms
- Number of incoming interconnections	200
- Number of outgoing interconnections	200
- Data length of all incoming interconnections, max.	2 000 Byte
- Data length of all outgoing interconnections, max.	2 000 Byte
- Data length per connection, max.	250 Byte
• HMI variables via PROFINET (acyclic)	
- Number of log-in stations for HMI variables (PN OPC/iMap)	3; 2 * PN OPC / 1 * iMap
- HMI variable updating	500 ms
- Number of HMI variables	200
- Data length of all HMI variables, max.	2 000 Byte
• PROFIBUS proxy functionality	
- supported	Yes
- Number of linked PROFIBUS devices	16
- Data length per connection, max.	240 Byte
1st interface	
Type of interface	Integral RS 485 interface
Physics	RS 485
isolated	Yes
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
• Point-to-point coupling	No
MPI	
• Number of connections	16
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	Yes
- S7 basic communication	Yes
- S7 communication	Yes
- S7 communication, as client	No
- S7 communication, as server	Yes
• Transmission speeds, max.	12 MBit/s

PROFINET/Industrial Ethernet

ET 200pro distributed I/O

IM 154-8 PN/DP CPU interface modules

Technical specifications (continued)

Order No.	6ES7 154-8AB00-0AB0
Product type description	IM 154-8 PN/DP CPU interface modules
DP master	
• Services	
- PG/OP communication	Yes
- Routing	Yes
- Global data communication	No
- S7 basic communication	Yes
- S7 communication	Yes
- S7 communication, as client	No
- S7 communication, as server	Yes
- equidistance support	Yes
- SYNC/FREEZE	Yes
- Activation/deactivation of DP slaves	Yes
- DPV1	Yes
• Transmission speeds, max.	12 MBit/s
• Number of DP slaves, max.	124
DP slave	
• Services	
- Routing	Yes
- Global data communication	No
- S7 basic communication	No
- S7 communication	Yes
- S7 communication, as client	No
- S7 communication, as server	Yes
- direct data exchange (cross traffic)	Yes
- DPV1	No
• Transmission speeds, max.	12 MBit/s
• Transfer memory	
- Inputs	244 Byte
- Outputs	244 Byte
• Address area, max.	32
2nd interface	
Type of interface	PROFINET
Physics	Ethernet
isolated	Yes
automatic detection of transmission speed	Yes
Functionality	
• MPI	No
• DP master	No
• DP slave	No
• PROFINET IO controller	Yes
• PROFINET CBA	Yes
• Point-to-point coupling	No

Order No.	6ES7 154-8AB00-0AB0
Product type description	IM 154-8 PN/DP CPU interface modules
PROFINET IO controller	
• Services	
- PG/OP communication	Yes
- Routing	Yes
- S7 communication	Yes
- open IE communication	Yes
• Transmission speed, max.	100 MBit/s
• Number of connectable IO-devices, max.	128
• Address area	
- Inputs, max.	2 048 Byte
- Outputs, max.	2 048 Byte
- Useful data consistency, max.	256 Byte
CPU/programming	
Programming language	
• STEP 7	Yes; From V 5.3 SP1 + HW-Support Package
• LAD	Yes
• FUP	Yes
• AWL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Operational stocks	see instruction list
Nesting levels	8
User program protection/ password protection	Yes
System functions (SFC)	see instruction list
System function blocks (SFB)	see instruction list
Isolation	
between backplane bus and all other circuit parts	Yes
between backplane bus and electronics	No
between supply and all other circuit parts	Yes
Degree of protection	
IP20 rear	Yes
Standards, approvals, certificates	
CE symbol	Yes
CSA approval	No
C-TICK	Yes
cULus	Yes
FM approval	No
Dimensions	
Width	135 mm
Height	130 mm
Depth	65 mm
Weights	
Weight, approx.	555 g

PROFINET/Industrial Ethernet

ET 200pro distributed I/O

IM 154-8 PN/DP CPU interface modules

2

Ordering data	Order No.	Order No.
IM 154-8 PN/DP CPU interface module PROFINET IO Controller to operate distributed I/Os on PROFINET, with integrated PLC functionality	6ES7 154-8AB00-0AB0	
Accessories		
MMC 64 KB ¹⁾	6ES7 953-8LF20-0AA0	
For program backup		
MMC 128 KB ¹⁾	6ES7 953-8LG11-0AA0	
For program backup		
MMC 512 KB ¹⁾	6ES7 953-8LJ20-0AA0	
For program backup		
MMC 2 MB ¹⁾	6ES7 953-8LL20-0AA0	
For program backup and/or firmware update		
MMC 4 MB ¹⁾	6ES7 953-8LM20-0AA0	
For program backup		
MMC 8 MB ¹⁾	6ES7 953-8LP20-0AA0	
For program backup		
Connecting module	6ES7 194-4AN00-0AA0	
For CPU IM 154-8 PN/DP, with 4 x M12 and 2 x 7/8", to connect PROFINET and PROFIBUS DP		
SCALANCE X-200 Industrial Ethernet Switches	6GK5 208-0HA00-2AA6	
With integral SNMP access, Web diagnosis, copper cable diagnosis and PROFINET diagnosis, for setting up linear, star and ring structures SCALANCE X208PRO, in degree of protection IP65, with eight 10/100 Mbit/s M12 ports, incl. eleven M12 dust caps		
Industrial Ethernet FC RJ45 Plug 180		
RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet		
<ul style="list-style-type: none"> • 1 unit • 10 units • 50 units 	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0	
Accessories (continued)		
Industrial Ethernet FastConnect installation cables		
<ul style="list-style-type: none"> • Fast Connect standard cable • Fast Connect trailing cable • Fast Connect marine cable 	6XV1 840-2AH10 6XV1 840-3AH10 6XV1 840-4AH10	
Industrial Ethernet Fast Connect		
Stripping Tool	6GK1 901-1GA00	
IE Connecting Cable M12-180/M12-180		
Preassembled IE FC TP Trailing Cable GP 2 x 2 (PROFINET Type C) with two 4-pin M12 plugs (4-pin, D-coded), degree of protection IP65/IP67, length:		
<ul style="list-style-type: none"> • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m 	6XV1 870-8AE30 6XV1 870-8AE50 6XV1 870-8AH10 6XV1 870-8AH15 6XV1 870-8AH20 6XV1 870-8AH30 6XV1 870-8AH50 6XV1 870-8AN10 6XV1 870-8AN15	
IE M12 Plug PRO		
M12 plug-in connector suitable for on-site assembly (D-coded), metal enclosure, fast connection, for SCALANCE X208PRO and IM 154-4 PN		
<ul style="list-style-type: none"> • 1 unit • 8 units 	6GK1 901-0DB10-6AA0 6GK1 901-0DB10-6AA8	
IE panel feedthrough		
Cabinet feedthrough for converting from the M12 connection system (D-coded, IP65/IP67) to the RJ45 connection system (IP20), 1 pack = 5 units	6GK1 901-0DM20-2AA5	

¹⁾ An MMC is essential for operating the CPU

PROFINET/Industrial Ethernet

ET 200M distributed I/Os

IM 153-4 PN

Overview



- To connect ET 200M to PROFINET IO (via copper line, RJ45) as an IO device
- Integrated 2-port switch
- 12 modules per station
- Usable I/O capacity: 192 bytes each
- Active bus backplane to hot-swap modules available as an option
- Baud rate 10 Mbit/s / 100 Mbit/s (autonegotiation / full duplex)
- I&M functions in accordance with PROFIBUS International guidelines order no. 3.502, version V1.1

Micro Memory Card with at least 64 KB required.

Technical specifications

Order No.	6ES7 153-4AA00-0XB0
Product type description	IM 153-4 PN
Supply voltages	
Rated value	
• DC 24 V	Yes
Power supply and voltage jumpering	
• Mains/voltage failure jumpering	5 ms
Current consumption	
Current consumption, max.	600 mA
Power loss, typ.	6 W
Address area	
Addressing volume	
• Outputs	192 Byte
• Inputs	192 Byte
Hardware config.	
Number of modules per DP slave interface, max.	12
Communication functions	
Bus protocol/transmission protocol	PN IO
Status information/alarms/diagnostics	
Diagnostics indication LED	
• Connection to network LINK (green)	Yes
• Transmit/receive RX/TX (yellow)	Yes
Environmental requirements	
Operating temperature	
• min.	0 °C
• max.	60 °C
Degree and class of protection	
• IP 20	Yes
Dimensions	
Dimensions	
Width	40 mm
Height	125 mm
Depth	118 mm
Weights	
Weight, approx.	215 g

PROFINET/Industrial Ethernet

ET 200M distributed I/Os

IM 153-4 PN

Ordering data	Order No.	Order No.
IM 153-4 PN interface module I/O device to connect an ET 200M to PROFINET	6ES7 153-4AA00-0XB0	
Accessories		
Bus modules for ET 200M <ul style="list-style-type: none"> To accommodate a power supply and an IM 153 for the hot-swapping function during RUN, incl. bus module cover To accommodate two 40-mm wide I/O modules for the hot-swapping function To accommodate one 80-mm wide I/O module for the hot-swapping function 	6ES7 195-7HA00-0XA0 6ES7 195-7HB00-0XA0 6ES7 195-7HC00-0XA0	
SIMATIC Micro Memory Card 64 KB ¹⁾	6ES7 953-8LF20-0AA0	
SIMATIC DP DIN rail for ET200M For insertion of up to 5 bus modules for <ul style="list-style-type: none"> Length: 483 mm (19") Length: 530 mm 	6ES7 195-1GA00-0XA0 6ES7 195-1GF30-0XA0	
SIMATIC S7-300 DIN rail <ul style="list-style-type: none"> Length: 160 mm Length: 480 mm (19") Length: 530 mm Length: 830 mm Length: 2,000 mm 	6ES7 390-1AB60-0AA0 6ES7 390-1AE80-0AA0 6ES7 390-1AF30-0AA0 6ES7 390-1AJ30-0AA0 6ES7 390-1BC00-0AA0	
S7 Manual Collection Electronic manuals on DVD, multi-language: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication)	6ES7 998-8XC01-8YE0	
S7 Manual Collection update service for 1 year Scope of delivery: Current DVD "S7 Manual Collection" and the three subsequent updates	6ES7 998-8XC01-8YE2	
Accessories (continued)		
Compact Switch Module CSM 377 Unmanaged Switch for connecting a SIMATIC S7-300 CPU and up to three additional nodes to Industrial Ethernet with 10/100 Mbit/s; 4 x RJ45 ports; external 24 V DC power supply, LED diagnostics, S7-300 module incl. electronic manual on CD-ROM	6GK7 377-1AA00-0AA0	
Industrial Ethernet Switch SCALANCE X208 managed Switch with integrated SNMP access, Web diagnostics, copper cable diagnostics and PROFINET diagnostics, for configuring line, star and ring topologies; with integrated redundancy manager; with eight 10/100 Mbit/s RJ45 ports	6GK5 208-0BA10-2AA3	
Industrial Ethernet FC RJ45 Plug 180 RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet <ul style="list-style-type: none"> 1 unit 10 units 50 units 	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0	
Industrial Ethernet FastConnect installation cables <ul style="list-style-type: none"> Fast Connect standard cable Fast Connect trailing cable Fast Connect marine cable 	6XV1 840-2AH10 6XV1 840-3AH10 6XV1 840-4AH10	
Industrial Ethernet FastConnect Stripping Tool	6GK1 901-1GA00	

¹⁾ To operate the IM153-4, an MMC is required with at least 64 KB memory. Cards with higher memory capacity may also be used.

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

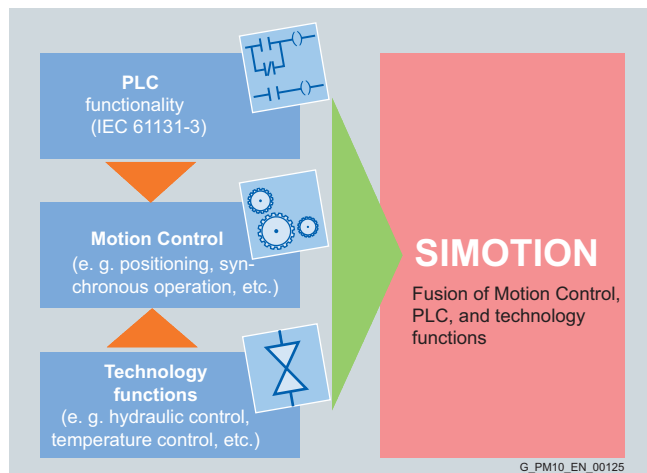
The SIMOTION system

Overview

2



The system approach



SIMOTION is recommended for all machines with Motion Control tasks – from simple to high-performance. The focus is on a simple and flexible solution for the greatest possible range of Motion Control tasks. In order to achieve this in the best way possible, a new system approach has been introduced.

The fusion of Motion Control with two other control functions which are found in most machines: PLC and technology functions.

This approach enables motion control and complete machine control within the same system. The same applies to technology functions, such as pressure control of a hydraulic axis. A seamless switch can be made from position-controlled positioning mode to pressure control.

Combining the three open-loop control functions of Motion Control, PLC and technology functions has the following benefits:

- Reduced engineering overhead and increased machine performance
- Fast system response – Time-critical interfaces between the individual components are no longer required
- Simple, uniform and transparent programming as well as diagnostics of the entire machine

The SIMOTION system is made up of three components:

Engineering system

SCOUT enables Motion Control, PLC and technology functions to be incorporated in one comprehensive, integrated system and provides all the necessary tools: From programming and parameterization through testing and commissioning, to diagnostics.

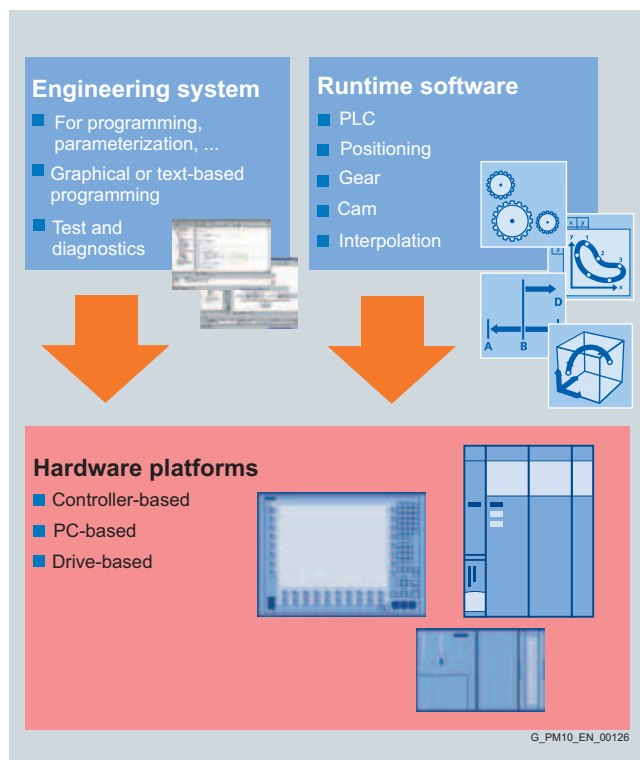
Runtime software

The runtime system offers an ingenious execution system for cyclic **and** sequential tasks. The runtime modules make the different PLC, Motion Control and technology functions available. By selecting the appropriate modules, the overall functionality of the system can be flexibly adapted to the machine.

Hardware platforms

The hardware platforms are the basis of the SIMOTION Motion Control System. The application created with the engineering system and the associated runtime software modules can be implemented on different hardware platforms.

You can therefore always select the platform that suits your machine best, as a controller, industrial PC or intelligent drive.



PROFINET/Industrial Ethernet

Motion Control System SIMOTION

The hardware platforms

Overview

Automation systems are primarily identified by the following characteristics:

- System-specific characteristics, e.g. functionality and engineering
- Hardware-dependent characteristics, e.g. performance, design and expandability

However, mechanical engineering demands vary greatly, depending on the version of the machine in question.

Every hardware platform has its benefits when used in certain applications. The various platforms can also be combined very easily, which is a particular advantage in modular machines and plants. This is because the individual hardware platforms always contain the same system characteristics, i.e. functionality and engineering are always identical, irrespective of the platform used.

PROFIBUS or PROFINET can be used to create the link to the drives and the I/Os remotely.

PROFIBUS/PROFINET can also be used for communication with HMI devices such as SIMATIC HMI or higher-level controllers such as SIMATIC S7. This means that SIMATIC HMI panels as well as PCs with ProTool/Pro or WinCC flexible can be used as operator systems.

Even 3rd party applications communicate with SIMOTION by means of the OPC interface.

SIMOTION D – Compact and integrated in the drive



In SIMOTION D, the SIMOTION functionality is integrated directly in the closed-loop control module of the SINAMICS S120 drive system. Therefore, the complete system (consisting of the open-loop control and the drive) is extremely compact and powerful. Two SIMOTION D versions are available: as a single-axis SIMOTION D410 system and as a multi-axis SIMOTION D4x5 system in different performance variants. This ensures a high degree of scalability and flexibility. The field of application ranges from single axes to high-performance multi-axis machines.

SIMOTION D4x5 is supplied with two integrated PROFIBUS interfaces supporting PROFIdrive and two integrated Industrial Ethernet interfaces. An optional Communication Board is used to connect via PROFINET. With SIMOTION D410, a PROFIBUS variant or a PROFINET variant can be selected.

SIMOTION C – Modularity and flexibility

SIMOTION C is a controller based on the SIMATIC S7-300 design. It is supplied with four integrated interfaces for analog or stepper drives and several integrated digital inputs and outputs. SIMOTION C can also be expanded using I/O modules from the SIMATIC S7-300 range. Furthermore, the controller is supplied with two PROFIBUS interfaces supporting PROFIdrive and an Industrial Ethernet interface, thus offering great flexibility in communication.

SIMOTION P – Open for other tasks

SIMOTION P350 is a PC-based Motion Control System. The operating system is Windows XP Professional, with a real-time expansion for SIMOTION. Apart from the SIMOTION machine applications, additional PC applications can execute at any time, e.g. the SIMOTION engineering system, an operator control application, process data evaluation, and other standard PC applications. Due to the high processor performance, SIMOTION P350 is optimized for applications with the highest performance requirements (e.g. hydraulic applications with highly dynamic position and pressure control loops).

Several panel variants in various screen sizes are available for operating the industrial PC. These panels can either be operated using a keyboard and mouse, or a touch screen. The drives and I/Os are connected via two PROFIBUS interfaces supporting PROFIdrive or PROFINET with an optional Communication Board.

More information

More information regarding technical specifications and ordering data can be found in Catalog PM 21 "SIMOTION, SINAMICS S120 and Motors for Production Machines" and in the interactive catalog under "Automation Systems / SIMOTION Motion Control System"

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

SIMOTION P350-3

Overview



SIMOTION P350-3 is a PC-based, motion control system. The use of an industrial PC platform facilitates the running of the SIMOTION machine application (comprising of PLC, motion control and HMI functions) alongside standard PC applications on one platform. This is particularly useful in the case of applications that involve complex PC-based data management and analysis systems.

The operating system is Windows XP Professional, with a real-time expansion for SIMOTION.

To facilitate the connection of distributed components, SIMOTION P350-3 is available in both PROFINET and PROFIBUS versions.

Design

Interfaces

Display and diagnostics

With SIMOTION P, the display and diagnostics functions for the operating states are performed by a software monitor, which takes the form of an on-screen application window. This software monitor can be operated using your keyboard, mouse or touch panel.

Integrated interfaces

- 1 x COM 1 (V.24), VGA (via DVI adapter)
- 4 x USB 2.0
- 1 x MPI/PROFIBUS DP interface (integrated, not isochronous, isolated)
- 2 x Industrial Ethernet 10/100 Mbps/s (integrated)

Expansion slots

- 1 x PCI slot 265 mm (10.43 in)
PROFINET version:
occupied by MCI PN Communication Board
PROFIBUS version:
occupied by IsoPROFIBUS board
- 1 x PCI/ISA slot 170 mm (free)
e.g., for the purpose of retrofitting an additional Communication Board

Communication

PROFINET version

The MCI PN Communication Board that has been integrated in the PROFINET version enables the SIMOTION P350-3 to be connected to a PROFINET IO network. From a PROFINET perspective, the SIMOTION P350-3 thus assumes the role of a PROFINET IO controller.

To enable it to communicate with other PROFINET controllers, the SIMOTION P350-3 can be configured as both a PROFINET controller and a PROFINET device at the same time (I-Device).

PROFIBUS version

The PROFIBUS version features an integrated IsoPROFIBUS board, which offers two PROFIBUS DP interfaces for establishing PROFIdrive connections.

The free PCI slot can be used for the purpose of retrofitting an optional MCI PN Communication Board. This means that the PROFIBUS version can support both PROFIBUS and PROFINET on the same PC.

Compatible panel fronts

SIMOTION P350-3 can be connected to the following panel fronts:

- 12" with membrane-type keys
- 12" for touch screen operation
- 15" with membrane-type keys
- 15" for touch screen operation

The DVI/VGA interface can be used to connect an external monitor.

Expansion using distributed I/Os

PROFINET version

- Distributed I/Os (SIMATIC ET 200S/M/pro)
- Distributed drives (e.g. SINAMICS S120 Motor Modules with CU320 Control Unit and CBE20 Communication Board plus SINAMICS S120 Power Modules and CU310 PN Control Unit)
- Engineering systems (PG/PC) or
- HMI devices (e.g., MP, TP, OP)

PROFIBUS version

- Certified PROFIBUS standard slaves (DP-V0, DP-V1, DP-V2)
- Distributed I/Os (SIMATIC ET 200S/M/eco/pro)
- Distributed drives (e.g. SINAMICS S120 Motor Modules with CU320 Control Unit plus SINAMICS S120 Power Modules and CU310 DP Control Unit)
- Engineering systems (PG/PC) or
- HMI devices (e.g., MP, TP, OP)

PC technology

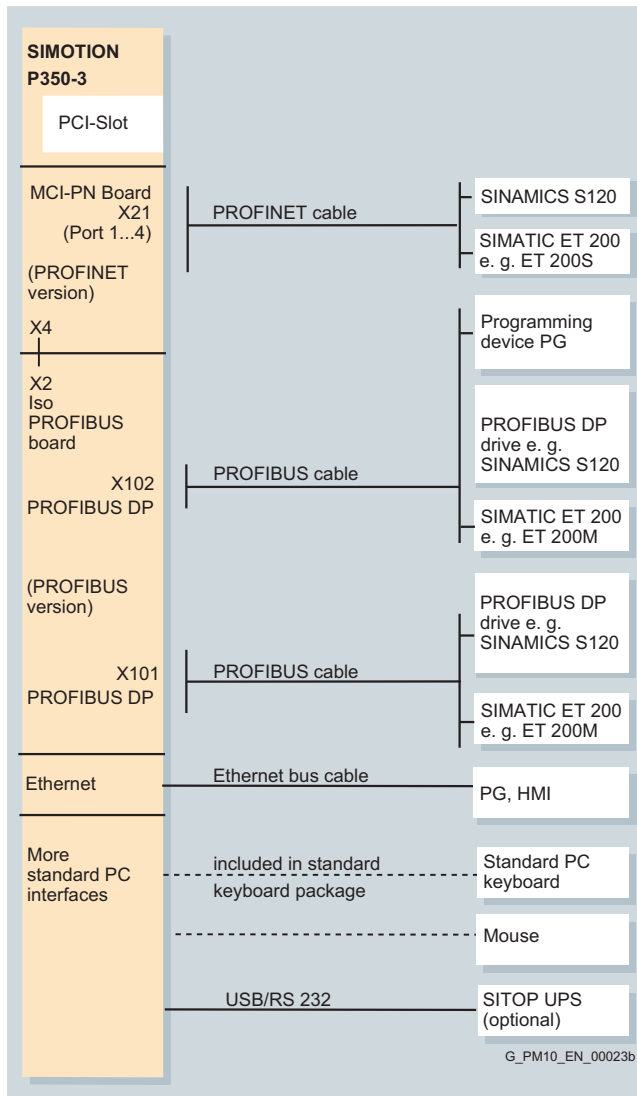
- Processor: Intel Pentium M 2 GHz
- Microsoft Windows XP Professional operating system, English
- 512 MB SDRAM, upgradable to 1 GB
- Hard disk with shock damping, approx. 40 GB
- DVD-ROM drive (optional)
- Data backup/restore using the Symantec Ghost data backup software (pre-installed)

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

SIMOTION P350-3

Integration



Overview of the SIMOTION P350-3 connections

More information

For additional information about connectable I/O modules, refer to "SIMOTION I/O components" and "SIMOTION Overview of functions".

SIZER configuration tool

With the SIZER configuration tool, you can easily configure the SINAMICS S120 drive family including SIMOTION. It provides you with support for selecting and dimensioning the components required for a motion control task. You can also determine the possible number of axes and the resulting load with SIZER in accordance with your performance requirements.

For further information about SIZER, refer to the section "System description – Dimensioning: SIZER configuration tool".

Technical specifications

Product type description	SIMOTION P350-3
Input voltage	24 V DC
Max. power consumption	190 W
Max. mains buffering	20 ms
Degree of protection according to EN 60529 (IEC 60529)	IP20
Max. temperature change	10 K/h
Relative humidity limit values according to IEC 68-2-3, IEC 68-2-30, IEC 68-2-56	
• Storage and transport	5 ... 95 % at +25 °C (+77 °F)
• Operation	5 ... 80 % at +25 °C (+77 °F)
Humidity rating in accordance with EN 60721-3-3	Class 3K5 Condensation and icing excluded Low air temperature 0 °C (32 °F)
Permissible ambient temperature	
• Storage and transport	-20 ... +60 °C (-4 ... +140 °F)
• Operation	+5 ... +45 °C (+41 ... +113 °F)
Weight, approx.	6 kg (13.2 lb)
Dimensions (W x H x D)	297 mm x 267 mm x 85 mm (11.69 in x 10.51 in x 3.35 in) (excluding DVD drive) 297 mm x 267 mm x 106 mm (11.69 in x 10.51 in x 4.17 in) (including DVD drive)

Ordering data

Ordering data	Order No.
SIMOTION P350-3, PROFIBUS version with Intel Pentium M, 2 GHz, Windows XP Professional, English, 512 MB SDRAM, 24 V DC, with IsoPROFIBUS board	
• Without DVD drive	6AU1350-3AK41-1BE2 –Z¹⁾
• With DVD drive	6AU1350-3AK43-1BE2 –Z¹⁾
SIMOTION P350-3, PROFINET version with Intel Pentium M, 2 GHz, Windows XP Professional, English, 512 MB SDRAM, 24 V DC, with MCI PN board	
• Without DVD drive	6AU1350-3AK41-2BE2 –Z¹⁾
• With DVD drive	6AU1350-3AK43-2BE2 –Z¹⁾
Memory expansion	
• 128 MB DDR2 533 SODIMM	6ES7648-2AG10-0GA0
• 256 MB DDR2 533 SODIMM	6ES7648-2AG20-0GA0
• 512 MB DDR2 533 SODIMM	6ES7648-2AG30-0GA0
MCI PN Communication Board (for PROFINET upgrade)	6AU1390-0BA00-0AA0
Replacement parts	
• Motherboard battery	6FC5247-0AA18-0AA0

¹⁾ Note regarding runtime software
When ordering SIMOTION P350-3, the pre-installed runtime version must be specified.
Additional runtime software licenses can either be pre-installed on a SIMOTION P350-3 or ordered separately.

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

SIMOTION D410

Overview



SIMOTION D410 is the SIMOTION D platform for single-axis applications. It supplements the SIMOTION D4x5 controller family, which is the solution of choice for multi-axis applications. It is available in both PROFIBUS (D410 DP) and PROFINET (D410 PN) versions.

The SIMOTION D410 Control Unit is specially designed for use with the SINAMICS S120 PM340 Power Modules in blocksize format and can be directly connected to the Power Modules of this series. The SIMOTION D410 can also be installed on a separate mounting plate if required (to be ordered separately).

The SIMOTION D410 handles the motion control, technology and PLC functions associated with a single axis and is also responsible for the drive control of that axis. The integrated inputs/outputs support up to 4 high-speed cam outputs or 3 measuring inputs.

The drive control supports servo control (for a highly dynamic response), vector control (for maximum torque accuracy) and V/f control.

SIMOTION D410 can be used in synchronized groups:

- For PROFINET:
over controller-controller or controller-device relationship
- For PROFIBUS:
over master-slave relationship

Design

Interfaces

Display and diagnostics

- LEDs to display operating states and errors
- 3 measuring sockets

Integrated I/Os

- 4 digital inputs
- 4 digital inputs/outputs (max. 4 as cam output or 3 as measuring inputs)

Communication

- 1 x DRIVE-CLiQ
- 2 x PROFINET ports (D410 PN only)
- 1 x PROFIBUS DP (D410 DP only)

Data backup

- 1 slot for SIMOTION CompactFlash Card

Additional interfaces

- Terminals for 24 V electronic power supply
- 1 encoder input for
 - HTL/TTL incremental encoder
 - SSI absolute encoder (with/without TTL/HTL incremental signals)
- 1 temperature sensor input (KTY84-130 or PTC)
- PM IF interface (Power Module interface) on rear for direct operation with a SINAMICS S120 PM340 Power Module in blocksize format

Assembly/Installation

SIMOTION D410 can be directly plugged in to the SINAMICS S120 Power Module PM340 in blocksize format.

Alternatively, the SIMOTION D410 can be mounted on a separate mounting plate (to be ordered separately) and connected to the PM340 Power Module via DRIVE-CLiQ. In this case, the CUA31/CUA32 Control Unit Adapter has to be connected to the PM340 Power Module. No more than one Control Unit Adapter can be connected to a SIMOTION D410.

Power Modules in AC/AC chassis format are connected to the SIMOTION D410 over the DRIVE-CLiQ interface.

Data storage/data backup

The SIMOTION D410 has a 7 KB memory for remanent storage of process variables. The runtime software, user data and user programs are backed up on the SIMOTION CompactFlash Card. In the event that the SIMOTION D410 needs to be replaced, the process variables can also be backed up on the SIMOTION CompactFlash Card (CF) by means of system commands.

Connectable I/Os

PROFINET IO: (D410 PN only)

- SIMATIC ET 200S/M/pro distributed I/Os
- HMI

PROFIBUS DP: (D410 DP only)

- Certified PROFIBUS standard slaves (DP-V0, DP-V1, DP-V2)
- SIMATIC ET 200S/M/eco/pro distributed I/O systems
- HMI

DRIVE-CLiQ:

Modules from the SINAMICS range:

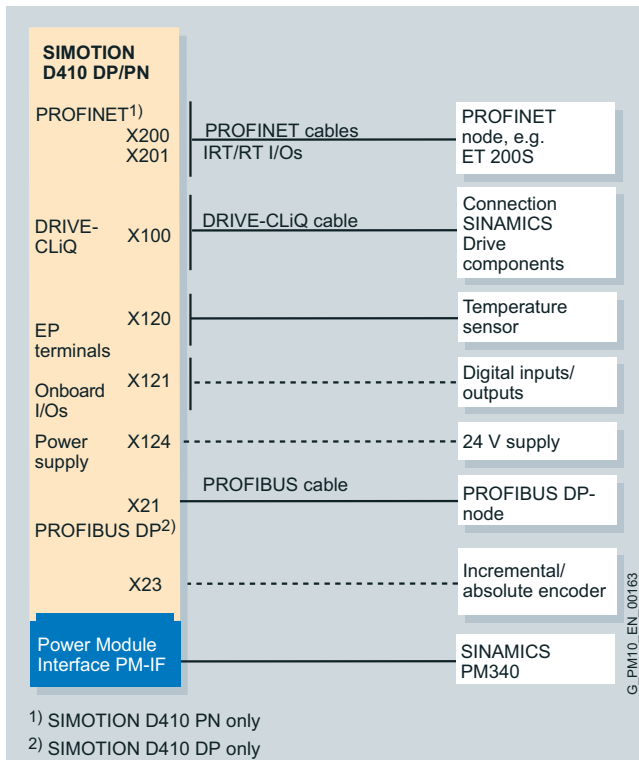
- TM15, TM17 High Feature, TM31, etc. Terminal Modules (max. 3)
- SMC/SME Sensor Modules (max. 2)
- DMC20 DRIVE-CLiQ hub module (max. 1)
- Motors with DRIVE-CLiQ interface

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

SIMOTION D410

Integration



Overview of SIMOTION D410 connections

The maximum permissible cable lengths should be taken into account when planning the cable layout.

Functional faults can occur when using longer cables.

The permissible length of the PROFIBUS DP cables depends on the configuration.

Technical specifications

Product type description	SIMOTION D410
PLC and motion control performance	
Maximum number of axes	1 (real axis)
Minimum PROFIBUS cycle	2 ms (D410 DP)
Minimum PROFINET transmission cycle	0.5 ms (D410 PN)
Minimum servo/interpolator cycle clock	2.0 ms
RAM (Random Access Memory)	25 MB
Integrated drive control	
Max. number of axes for integrated drive control (servo / vector / V/f)	1 / 1 / 1
Memory	
RAM (Random Access Memory)	25 MB
RAM disk (load memory)	17 MB
Retentive memory	7 KB
Persistent memory (user data on CF)	300 MB
Communication	
DRIVE-CLiQ interfaces	1
PROFIBUS interfaces	1 (D410 DP only) <ul style="list-style-type: none"> • Equidistant and isochronous • Can be configured as master or slave
PROFINET interfaces	1 interface with 2 ports (D410 PN only) <ul style="list-style-type: none"> • Supports PROFINET IO with IRT and RT • Can be configured as PROFINET IO controller or device
General technical specifications	
Fan	Integrated
Supply voltage	
• Rated value	24 V DC
• Permissible range	20.4 ... 28.8 V
Current consumption, typ. (excluding digital outputs and DRIVE-CLiQ supply)	800 mA
Starting current, typ.	3.0 A
Power loss	20 W
Permissible ambient temperature	
• Storage and transport	-40 ... +70 °C (-40 ... +158 °F)
• Operation	0 ... +55 °C; maximum installation altitude 2000 m (6562 ft) above sea level. Above an altitude of 2000 m (6562 ft), the max. ambient temperature decreases by 7 °C (44.6 °F) every 1000 m (3281 ft). Max. 5000 m (16405 ft) above sea level.
Permissible relative humidity (without condensation)	5 ... 95 %
Atmospheric pressure	700 ... 1060 hPa
Degree of protection according to EN 60529 (IEC 60529)	IP20
Dimensions (W x H x D)	73 mm x 183.2 mm x 89.6 mm (2.87 in x 7.21 in x 3.53 in)
Weight	
• SIMOTION D	990 g (2.18 lb)
• CompactFlash Card	7 g (0.25 oz)

2

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

SIMOTION D410

Technical specifications (continued)

Product type description	SIMOTION D410
Digital inputs	4
<ul style="list-style-type: none"> Input voltage <ul style="list-style-type: none"> - Rated value - For "1" signal - For "0" signal Galvanic isolation Current consumption typ. at 1-signal level Input delay, typ. (hardware) 	24 V DC 15 ... 30 V -3 ... +5 V Yes, in groups of 4 10 mA at 24 V L -> H: 50 µs H -> L: 100 µs
Digital inputs/outputs (parameterizable)	4 (max. 3 as high-speed measuring inputs, max. 4 as high-speed cam outputs)
If used as an input	
<ul style="list-style-type: none"> Input voltage <ul style="list-style-type: none"> - Rated value - For "1" signal - For "0" signal Isolation Current consumption typ. at 1 signal level Input delay, typ. (hardware) 	24 V DC 15 ... 30 V -3 ... +5 V No 10 mA at 24 V L -> H: 50 µs (5 µs if used as measuring input) H -> L: 100 µs (50 µs if used as measuring input)
<ul style="list-style-type: none"> Measuring input, accuracy 	5 µs
If used as an output	
<ul style="list-style-type: none"> Rated load voltage Permissible range Isolation Current load, max. Residual current, max. Output delay, max. (hardware) Cam output, accuracy Short-circuit protection 	24 V DC 20.4 ... 28.8 V No 500 mA per output 2 mA L -> H: 400 µs H -> L: 100 µs 200 µs Yes

Product type description	SIMOTION D410
Onboard encoder interface	
<ul style="list-style-type: none"> Encoder interface Encoder supply Limit frequency, max. SSI baud rate Resolution absolute position SSI 	<ul style="list-style-type: none"> TTL or HTL incremental encoders (with adjustable parameters) SSI absolute encoders with/without TTL/HTL incremental signals 24 V DC/0.35 A or 5 V DC/0.35 A 500 kHz 100 ... 250 kBaud 30 bit
Max. cable length	
<ul style="list-style-type: none"> For TTL incremental encoder (only bipolar signals permitted) For HTL incremental encoder <ul style="list-style-type: none"> - For unipolar signals - For bipolar signals For SSI absolute encoder 	100 m (328 ft) 100 m (328 ft) 300 m (984 ft) 100 m (328 ft)
Additional technical specifications	
Input for temperature sensing	
<ul style="list-style-type: none"> Temperature sensor 	KTY84-130 or PTC
Non-volatile data backup	
<ul style="list-style-type: none"> Backup time, min. 	Unlimited (maintenance-free backup)
Approvals	cULus (File No. E164110)

Ordering data

Order No.
SIMOTION D410 DP (SIMOTION V4.1 SP1 or higher)
6AU1410-0AA00-0AA0
SIMOTION D410 PN (SIMOTION V4.1 SP1 or higher)
6AU1410-0AB00-0AA0
Backplane mounting plate For installing the SIMOTION D410 in a different location if you do not wish to connect it directly to the Power Module.
6AU1400-7AA05-0AA0
SIMOTION CompactFlash Card (CF) 1 GB With SIMOTION Kernel and up-to-date SINAMICS drive software
6AU1400-2PA00-0AA0

Industrial Ethernet Switches

SCALANCE X-200IRT
 Managed Industrial Ethernet switches;
 Isochronous Real-Time, LED diagnostics, fault signaling contact with SET button, redundant power supply; incl. operating instructions, Industrial Ethernet network manual and configuration software on CD-ROM

SCALANCE X-204IRT:
 4 x 10/100 Mbit/s RJ45 Ports

Order No.

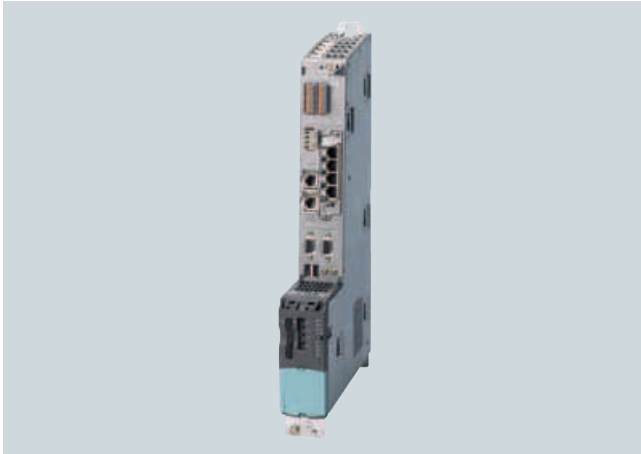
6GK5 204-0BA00-2BA3

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

SIMOTION D425/D435/D445

Overview



SIMOTION D4x5 is the drive-based Control Unit for multi-axis systems. The individual versions SIMOTION D425 (BASIC Performance), SIMOTION D435 (STANDARD performance) and SIMOTION D445 (HIGH Performance) differ in their PLC performance and motion control performance. The main distinguishing features are:

	SIMOTION D425 (BASIC Performance)	SIMOTION D435 (STANDARD Performance)	SIMOTION D445 (HIGH Performance)
Maximum number of axes	16	32	64
Minimum servo/interpolator cycle clock	2.0 ms	1.0 ms	0.5 ms
DRIVE-CLiQ interfaces	4	4	6

SIMOTION D4x5 features PLC and motion control performance (open-loop control and motion control) for up to 16, 32 or 64 axes, as required. The computing functions integrated into the drive allow the D4x5 Control Unit to operate up to 6 servo, 4 vector or 8 V/f axes.

The drive control supports servo control (for a highly dynamic response), vector control (for maximum torque accuracy) and V/f control.

Extension of the drive computing performance

The motion control performance of a SIMOTION D4x5 can be utilized in full by expanding the computing performance at the drive in two different ways:

- Over PROFIBUS or PROFINET, SINAMICS S120 CU320/CU310 Control Units complete with further SINAMICS S120 drive modules can be connected.
- With SIMOTION D435 and D445, the CX32 Controller Extension can be connected over DRIVE-CLiQ. This module is extremely compact and can control up to 6 servo, 4 vector or 8 V/f axes.

Design

Interfaces

Display and diagnostics

- LEDs to display operating states and errors
- 3 measuring sockets

Integrated I/Os

- 8 digital inputs
- 8 digital inputs/outputs (max. 8 as high-speed cam outputs, max. 6 as high-speed measuring inputs)

Communication

- 4 x DRIVE-CLiQ (6 x DRIVE-CLiQ for D445)
- 2 x Industrial Ethernet
- 2 x PROFIBUS DP

Option Boards

- CBE30 Communication Board for the connection to PROFINET IO
- TB30 Terminal Board for the expansion with 4 digital inputs, 4 digital outputs, 2 analog inputs and 2 analog outputs

Data backup

- 1 slot for SIMOTION CompactFlash Card

Additional interfaces

- Terminals for 24 V electronic power supply

Connectable I/Os

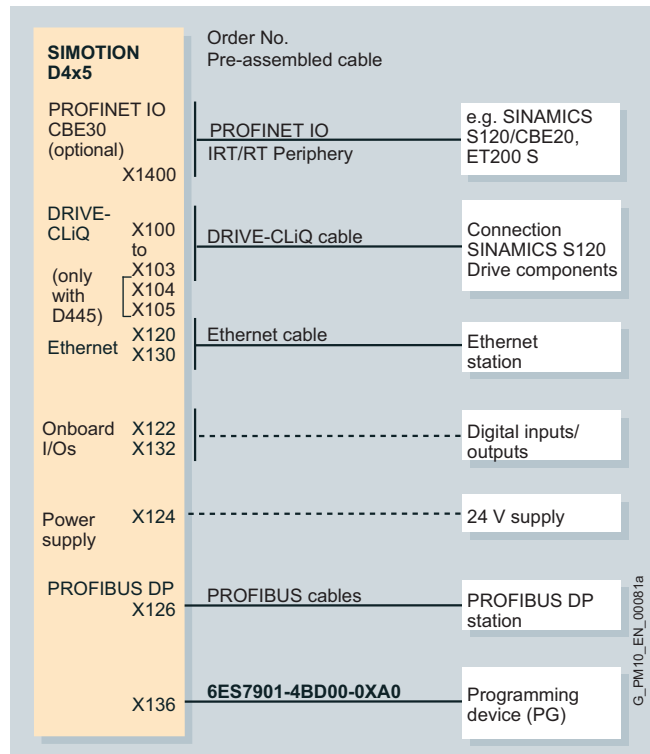
PROFINET IO: (optionally via CBE30)

- SIMATIC ET 200S/M/pro distributed I/Os
- Distributed drives with the CU320 Control Unit via CBE20 as well as the SINAMICS S120 PM340 Power Modules with the CU310 PN

PROFIBUS DP:

- Certified PROFIBUS standard slaves (DP-V0, DP-V1, DP-V2)
- SIMATIC ET 200S/M/eco/pro distributed I/O systems
- Distributed drives with the CU320 Control Unit as well as SINAMICS S120 PM340 Power Modules with the CU310 DP

Integration



Overview of SIMOTION D425/D435/D445 connections

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

SIMOTION D425/D435/D445

Technical specifications

Product type description	SIMOTION D425 BASIC Performance	SIMOTION D435 STANDARD Performance	SIMOTION D445 HIGH Performance
PLC and Motion Control performance			
Maximum number of axes	16	32	64
Minimum PROFIBUS cycle	2 ms	1 ms	1 ms
Minimum PROFINET transmission cycle	0.5 ms	0.5 ms	0.5 ms
Minimum servo/interpolator cycle clock	2.0 ms	1.0 ms	0.5 ms
Integrated drive control			
Max. number of axes for integrated drive control (servo / vector / V/f)	6 / 4 / 8	6 / 4 / 8	6 / 4 / 8
Memory			
• RAM (Random Access Memory)	25 MB	25 MB	50 MB
Supply voltage			
• Rated value	24 V DC	24 V DC	24 V DC
• Permissible range	20.4 ... 28.8 V	20.4 ... 28.8 V	20.4 ... 28.8 V
Current consumption, typ. (excluding digital outputs and DRIVE-CLiQ supply)	600 mA	600 mA	2 A
Starting current, typ.	6.0 A	6.0 A	6.0 A
Power loss	15 W	15 W	48 W
Permissible ambient temperature			
• Storage and transport	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
• Operation	0 ... +55 °C (+32 ... +131 °F) Maximum installation altitude 2000 m (6562 ft) above sea level. Above an altitude of 2000 m (6562 ft), the max. ambient temperature decreases by 7 °C (44.6 °F) every 1000 m (3281 ft); maximum 5000 m (16405 ft) above sea level.	0 ... +55 °C (+32 ... +131 °F) Maximum installation altitude 2000 m (6562 ft) above sea level. Above an altitude of 2000 m (6562 ft), the max. ambient temperature decreases by 7 °C (44.6 °F) every 1000 m (3281 ft); maximum 5000 m (16405 ft) above sea level.	0 ... +55 °C (+32 ... +131 °F) Maximum installation altitude 2000 m (6562 ft) above sea level. Above an altitude of 2000 m (6562 ft), the max. ambient temperature decreases by 7 °C (44.6 °F) every 1000 m (3281 ft); maximum 5000 m (16405 ft) above sea level.
Permissible relative humidity (without condensation)	5 ... 95 %	5 ... 95 %	5 ... 95 %
Atmospheric pressure	700 ... 1060 hPa	700 ... 1060 hPa	700 ... 1060 hPa
Degree of protection according to EN 60529 (IEC 60529)	IP20	IP20	IP20
Dimensions (W x H x D)	50 mm x 380 mm x 230 mm (1.97 in x 14.96 in x 9.06 in)	50 mm x 380 mm x 230 mm (1.97 in x 14.96 in x 9.06 in)	50 mm x 380 mm x 270 mm (1.97 in x 14.96 in x 9.06 in)
Weight			
• SIMOTION D	2500 g (5.51 lb)	2500 g (5.51 lb)	3600 g (7.94 lb)

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

SIMOTION D425/D435/D445

Ordering data		Order No.	
SIMOTION D425		6AU1425-0AA00-0AA0	
SIMOTION D435		6AU1435-0AA00-0AA1	
SIMOTION D445		6AU1445-0AA00-0AA0	
CompactFlash Card (CF) 1 GB with SINAMICS S120 drive software and SIMOTION Kernel Pre-installed license using Z options ¹⁾		6AU1400-2PA00-0AA0	
SIMOTION MultiAxes Bundle D425 consisting of 1 unit each • SIMOTION D425 • CompactFlash Card 1 GB with MultiAxes Package license for D425 platform		6AU1425-0AA00-0CA0	
SIMOTION MultiAxes Bundle D435 consisting of 1 unit each • SIMOTION D435 • CompactFlash Card 1 GB with MultiAxes Package license for D435 platform		6AU1435-0AA00-0CA1	
SIMOTION MultiAxes Bundle D445 consisting of 1 unit each • SIMOTION D445 • CompactFlash Card 1 GB with MultiAxes Package license for D445 platform		6AU1445-0AA00-0CA0	
Battery and fan module Incl. battery Battery and fan module for D425/D435 (option). Included in the scope of supply of D445.		6FC5348-0AA01-0AA0	

Accessories		Order No.	
Battery (replacement part)		6FC5247-0AA18-0AA0	
PROFIBUS RS485 bus connector with angular cable outlet (35°) With screw-type terminals, max. transmission rate 12 Mbit/s • Without PG interface • With PG interface		6ES7972-0BA41-0XA0 6ES7972-0BB41-0XA0	
PROFIBUS FastConnect RS485 bus connector with angular cable outlet (35°) With insulation displacement terminals, max. transmission rate 12 Mbit/s • Without PG interface • With PG interface		6ES7972-0BA60-0XA0 6ES7972-0BB60-0XA0	

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

CBE30 Communication Board

Overview



The CBE30 Communication Board for SIMOTION D425, D435 and D445 allows the SIMOTION to be connected to a PROFINET IO network. The SIMOTION D4x5 then assumes the function of a PROFINET IO Controller and can perform the following:

- PROFINET IO Controller, I-Device (controller and device simultaneously)
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
 - RT (Real Time)
 - IRT (Isochronous Real Time)
- Integration of distributed I/O as PROFINET IO devices
- Integration of drives as PROFINET IO devices through PROFIdrive according to the V4 specification
- Support for standard Ethernet communication, e.g.
 - for interfacing with SIMOTION SCOUT
 - for the connection of HMI systems
 - for communication with any other devices over TCP/IP or UDP communication
- Integrated 4-port switch with four RJ45 sockets based on the PROFINET ASIC ERTEC400. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

Integration

The CBE30 Communication Board is plugged into the option slot on the SIMOTION D4x5.

Technical specifications

Product type description	CBE30 Communication Board
Current requirement at 24 V DC	0.25 A
Permissible ambient temperature	
• Storage and transport	-40 ... +70 °C (-40 ... +158 °F)
• Operation	0 ... 55°C (32 ... 131 °F)
Weight, approx.	100 g (0.22 lb)
Dimensions	113 mm x 77 mm (4.45 in x 3.03 in)
Approvals	cULus (File No. E164110)

Ordering data

**CBE30
Communication Board**

Order No.

6FC5312-0FA00-0AA0

Accessories

The following PROFINET cables and connectors are recommended:

RJ45 FastConnect connector for Industrial Ethernet/PROFINET

- 145° cable outlet
 - 1 pack = 1 unit
 - 1 pack = 10 units
- 180° cable outlet
 - 1 pack = 1 unit
 - 1 pack = 10 units

6GK1901-1BB30-0AA0
6GK1901-1BB30-0AB0

6GK1901-1BB10-2AA0
6GK1901-1BB10-2AB0

FastConnect cables for Industrial Ethernet/PROFINET ¹⁾

- IE FC Standard Cable GP 2x2
- IE FC Flexible Cable GP 2x2
- IE FC Trailing Cable GP 2x2
- IE FC Trailing Cable 2x2
- IE FC Marine Cable 2x2

6XV1840-2AH10
6XV1870-2B
6XV1870-2D
6XV1840-3AH10
6XV1840-4AH10

Stripping tool for Industrial Ethernet/PROFINET FastConnect cables

- IE FC stripping tool

6GK1901-1GA00

¹⁾ Sold by the meter;
max. length 1000 m (3281 ft);
minimum order 20 m (65.62 ft).

PROFINET/Industrial Ethernet

Motion Control System SIMOTION

MCI-PN Communication Board

Overview



The MCI PN Communication Board for SIMOTION P350-3 enables connection to a PROFINET IO network. This means that in terms of PROFINET, SIMOTION P350-3 is a PROFINET IO controller that offers the following functions:

- Communication as: PROFINET IO Controller, I-Device (controller and device simultaneously)
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
 - RT (Real Time)
 - IRT (Isochronous Real Time)
- Integration of distributed I/O as PROFINET IO devices
- Integration of drives as PROFINET IO devices through PROFIdrive according to the V4 specification
- Support for standard Ethernet communication, e.g.
 - for interfacing with SIMOTION SCOUT
 - for the connection of HMI systems
 - for communication with any other devices over TCP/IP or UDP communication
- Integrated 4-port switch with 4 RJ45 sockets based on the PROFINET ASIC, ERTEC400. The optimal topology (line, star, tree or ring) can therefore be constructed without the need for additional external switches.

Design

The MCI-PN communication board is inserted in the spare PCI slot of the SIMOTION P350-3.

Technical specifications

Product type description	MCI-PN Communication Board
Current consumption	900 mA at 5 V
Permissible ambient temperature	
• Storage and transport	-20 ... +60 °C (-4 ... +140 °F)
• Operation	+5 ... +55 °C (+41 ... +131 °F)
Weight, approx.	110 g (0.24 lb)
Dimensions	107 mm x 167 mm (4.21 in x 6.57 in)
Approvals	cULus (File No. E164110)

Ordering data

Order No.
MCI-PN communication board
6AU1390-0BA00-0AA0

Accessories

The following PROFINET cables and connectors are recommended:

RJ45 FastConnect connector for Industrial Ethernet/PROFINET

- 145° cable outlet
 - 1 pack = 1 unit
 - 1 pack = 10 units
- 180° cable outlet
 - 1 pack = 1 unit
 - 1 pack = 10 units

6GK1901-1BB30-0AA0
6GK1901-1BB30-0AB0

6GK1901-1BB10-2AA0
6GK1901-1BB10-2AB0

FastConnect cables for Industrial Ethernet/PROFINET ¹⁾

- IE FC Standard Cable GP 2x2
- IE FC Flexible Cable GP 2x2
- IE FC Trailing Cable GP 2x2
- IE FC Trailing Cable 2x2
- IE FC Marine Cable 2x2

6XV1840-2AH10
6XV1870-2B
6XV1870-2D
6XV1840-3AH10
6XV1840-4AH10

Stripping tool for Industrial Ethernet/PROFINET FastConnect cables

- IE FC stripping tool

6GK1901-1GA00

¹⁾ Sold by the meter;
max. length 1000 m (3281 ft);
minimum order 20 m (65.62 ft).

PROFINET/Industrial Ethernet

SINUMERIK CNC Automation Systems

SINUMERIK & SINAMICS

Overview



SINUMERIK 840D sl with SINAMICS S120

The new SINUMERIK 840D solution line offers modularity, open architecture, flexibility, uniform operation, programming and visualization and provides a system platform with future-oriented functions for nearly all technologies. Integrated into the SINAMICS S120 drive system and complemented by the SIMATIC S7-300 automation system, the SINUMERIK 840D sl forms a complete digital system that is best suited for the mid to upper performance range. The SINUMERIK 840D sl distinguishes itself through its flexibility, maximum dynamics, precision, and optimum integration in networks.

The SINUMERIK 840D sl combines CNC, HMI, PLC, closed-loop control and communication tasks on one SINUMERIK NCU (NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2 PN). Up to 6 axes are available with the SINUMERIK 840D sl with NCU 710.2. On the NCU 720.2/NCU 720.2 PN/NCU 730.2 and NCU 730.2 PN, the number of axes and/or the performance of the drive control can be increased to 31 axes.

SINAMICS S120 can be used to solve complex drive tasks for a very wide spectrum of industrial applications and consequently designed as a modular system toolbox. From a wide range of matched components and functions, the user uses just the combination that best meets the user's requirements. All SINUMERIK 840D sl and SINAMICS S120 components, including the motors and encoders, are interconnected via a joint serial interface called DRIVE-CLiQ.

Motors

The SINAMICS S120 drive system is enhanced by a wide range of synchronous and asynchronous motors.

Safety functions

The safety relevant functions of the SINUMERIK 840D sl system are integrated in the four subsystems NC, PLC, speed controller and drive. The safety directed functions are of two channel design; there is a crosswise data comparison between the two channels.

Application

SINUMERIK 840D sl is used worldwide:

- Turning, drilling, milling, grinding, laser machining, nibbling and punching technologies
- Tool and Mold Making
- Press control
- High-Speed Cutting
- Woodworking and textile processing
- Handling
- Transfer lines
- Rotary transfer machines
- Large-scale and jobshop production

The SINUMERIK is available as an export version for use in countries where approval is required.

More information

SINUMERIK 840D sl and SINAMICS S120: Catalog NC 61

Additional information is available in the Internet under:

<http://www.siemens.com/sinumerik>

PROFINET/Industrial Ethernet SINUMERIK CNC Automation Systems

SINUMERIK 840D sl - NCU 720.2 PN/NCU 730.2 PN

Overview



NCU 720.2 PN

The NCU 720.2 PN represents the medium expansions stage within SINUMERIK 840D sl with significantly higher PLC capacity compared to a NCU 720.2. The NCU 720.2 PN offers integrated PROFINET interfaces with PROFINET IO and PROFINET CBA.

Up to 31 axes are available in up to 10 machining channels which can be executed in up to 10 mode groups. Up to 12 axes/spindles are supported per channel. Interpolation is possible for a maximum of 12 axes with the NCU system software (multi-axis interpolation option).

The basic version of the CNC user memory is 3 MB, and can be optionally expanded up to 15 MB.

NCU 730.2 PN

The NCU 730.2 PN is the new flagship of the SINUMERIK 840D sl and, with a significantly higher PLC capacity than an NCU 730.1, represents the most advanced configuration within the SINUMERIK 840D sl range. The NCU 730.2 PN is the first NCU to offer integrated PROFINET interfaces with PROFINET IO and PROFINET CBA.

Up to 31 axes are available in up to 10 machining channels which can be executed in up to 10 mode groups. Up to 12 axes/spindles are supported per channel. Interpolation is possible for a maximum of 12 axes with the NCU system software (multi-axis interpolation option).

The basic version of the CNC user memory is 3 MB, and can be optionally expanded up to 15 MB.

Integration

The following components can be connected to the SINUMERIK 840D sl:

- SINUMERIK operator panel front with TCU, PCU 50.3, machine control panel, push button panel
- SIMATIC CE panel
- SINUMERIK handheld units
- Distributed PLC I/O via PROFIBUS DP connection or PROFINET IO
- SINAMICS S120 drive system
- Feed and main spindle motors

PROFINET/Industrial Ethernet

SINUMERIK CNC Automation Systems

SINUMERIK 840D sl - NCU 720.2 PN/NCU 730.2 PN

Technical specifications

Order No.	6FC5372-0AA01-0AA1	6FC5373-0AA01-0AA1
Product type description	SINUMERIK 840D sl; NCU 720.2 PN with PLC 319-3 PN/DP	SINUMERIK 840D sl; NCU 730.2 PN with PLC 319-3 PN/DP
RAM	512 Mbyte DDR2-SDRAM; 1 Mbyte SRAM	
SIMATIC S7 - integrated	PLC 319-3PN/DP	
Input voltage	24 V	
Degree of protection in accordance with DIN EN 60529 (IEC 60529)	IP20	
Humidity classification in accordance with DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).	
Relative humidity	<ul style="list-style-type: none"> • Storage 10 ... 95 % • Transport 10 ... 95 % • Operation ≤ 85 % over max. 2 months 	
Ambient temperature	<ul style="list-style-type: none"> • Storage -25 ... +55 °C (-13 ... +131 °F) • Transport -40 ... +70 °C (-40 ... +158 °F) • Operation 0 ... 55 °C (32 ... 131 °F) 	
Dimensions	<ul style="list-style-type: none"> • Width 50 mm (1.97 in) • Height 418 mm (16.46 in) • Depth 272 mm (10.71 in) 	
Weight, approx.	3.8 kg (8.38 lb)	

Ordering data

Order No.

Hardware

NCU 720.2 PN
with PLC 319-3PN/DP **6FC5372-0AA01-0AA1**

NCU 730.2 PN
with PLC 319-3PN/DP **6FC5373-0AA01-0AA1**

Seal for external heat dissipation
(1 pack = 10 units)
for NCU 710.2/
NCU 720.2/NCU 720.2 PN/
NCU 730.2/NCU 730.2 PN **6FC5348-0AA07-0AA0**

CNC user memory
Expanded by 2 MB each **6FC5800-0AD00-0YB0**

PLC user memory
Expanded by 128 KB each **6FC5800-0AD10-0YB0**

Software

HMI user memory
Additional 256 MB
on CF card of NCU
Software option
• Single license
without data carrier **6FC5800-0AP12-0YB0**

Spare and wear parts

Spacers
for NCU 720.2/NCU 720.2 PN/
NCU 730.2/NCU 730.2 PN **6FC5348-0AA06-0AA0**

Battery **6FC5247-0AA18-0AA0**

Dual fan/battery module **6FC5348-0AA02-0AA0**

Blanking cover
for Control Unit
CU320/NCU 710.2/
NCU 720.2/NCU 720.2 PN
NCU 730.2/NCU 730.2 PN **6SL3064-3BB00-0AA0**

CompactFlash Card 512 MB
Empty **6FC5313-4AG00-0AA2**

PROFINET/Industrial Ethernet

SINAMICS S120 Drive system

SINAMICS S120 built-in devices

Overview



Flexibility for successful machine concepts

As part of the SINAMICS drive family, the SINAMICS S120 drive is a modular system for high-performance applications in machine construction and plant engineering. SINAMICS S120 offers high-performance single-axis and multi-axis drives for a very broad range of industrial applications. By virtue of its scalability and flexibility, SINAMICS S120 is the ideal system for satisfying the ever increasing demand for more axes and better performance. SINAMICS S120 supports flexible machine designs and faster implementation of customized drive solutions.

The response to ever increasing demands

Modern machines must be built at ever lower cost, but deliver greater productivity. The SINAMICS S120 drive concept meets both these challenges! It is easy to configure and thus helps to reduce project completion times. Its excellent dynamic response and accuracy permit higher cycle rates for maximum productivity.

Applications in machine and plant engineering

Regardless of whether the application involves continuous material webs or cyclic, highly dynamic processes – SINAMICS S120 means increased machine performance in many sectors:

- Packaging machines
- Plastics processing machines
- Textile machines
- Printing machines
- Paper machines
- Hoisting equipment
- Handling and assembly systems
- Machine tools
- Rolling mills
- Test stands

Modularity for mechanical engineering

SINAMICS S120 is designed to allow free combination of power and control performance. Multi-axis drives with higher-level motion control can be implemented with the SINAMICS S120 modular system as easily as single-drive solutions.

Greater flexibility with central control intelligence

On the SINAMICS S120, the drive intelligence is combined with closed-loop control functions into Control Units.

These units are capable of controlling drives in Vector, Servo and V/f modes. They also perform the speed and torque control functions plus other intelligent drive functions for all axes on the drive.

Free performance selection for Vector and Servo control modes

The use of a SINAMICS S120 Vector control is recommended for drive solutions with continuous material webs, for example, wire-drawing machines, film and paper machines, as well as for hoisting gear, centrifuges and marine drives.

Servo control with SINAMICS S120 is employed for cyclic processes with precise, highly dynamic position control and servo motors, e.g. in textile, packaging, printing machines and machine tools.

SINAMICS S120 – functions for better efficiency

- Basic functions: Speed control, torque control, positioning functions
- Intelligent starting functions for independent restart after power supply interruption
- BICO technology with interconnection of drive-related I/Os for easy adaptation of the drive system to its operating environment
- Integrated safety functions for realizing the implementation of safety concepts
- Regulated infeed/regenerative feedback functions for preventing undesirable reactions on the supply, allowing recovery of braking energy and ensuring greater stability against line fluctuations.

DRIVE-CLiQ – the digital interface between all components

All SINAMICS S120 components, including the motors and encoders, are interconnected by a shared serial interface called DRIVE-CLiQ. DRIVE-CLiQ forms the backplane for the complete drive system. The standardized cables and connectors reduce the variety of different parts and cut storage costs. Converter boards (Sensor Modules) for converting standard encoder signals to DRIVE-CLiQ are available for third-party motors or retrofit applications.

Modular design ensures flexibility and scalability

The multi-axis design, also referred to as common DC bus, is very modular with a power offering of Line Modules and Motor Modules – both available in booksize compact, booksize and chassis formats. Line Modules function as the central energy supply to the voltage-source DC link. Line Modules are optionally available with regulated infeed/regenerative feedback to provide a constant DC link voltage. Motor Modules (DC/AC units) supply the motors with energy from the DC link. All the drive intelligence is organized into Control Units. The control units perform all the closed-loop control functions for the drive grouping. They also handle all other drive functions such as the interconnection of drive related I/O's, positioning functions, etc. and feature PROFIBUS DP or PROFINET as the central interface for linking to higher level automation systems.

On single axis units, also referred to as AC drives, the rectifier and inverter power section are contained in one device, the Power Module – available in blocksize and chassis formats. For single axis applications, drive control functions are performed by a single axis Control Unit (e.g. CU310) mounted on to the Power Module. This separation of power and intelligence allows for maximum flexibility and scalability. Integration into multi-axis applications is easily accomplished by connecting a DRIVE-CLiQ link to a multi-axis Control Unit (e.g. CU320). This is accomplished by mounting a CU adapter (CUA31) on a block size Power Module in place of the single axis Control Unit. Together this integrated line offers the most optimal drive solution for any application servo or vector.

2

PROFINET/Industrial Ethernet

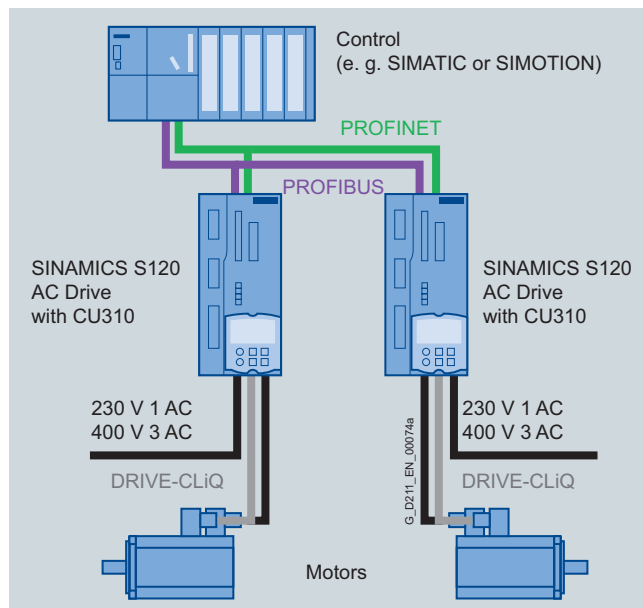
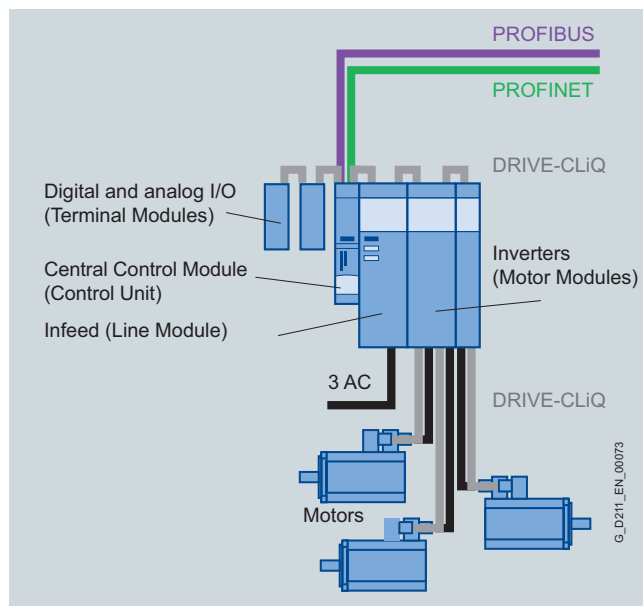
SINAMICS S120 Drive system

SINAMICS S120 built-in devices

Overview (continued)

All formats can be combined as required

The different SINAMICS S120 formats can be combined freely thanks to their DRIVE-CLiQ interfaces, e.g. Line Modules in chassis format can be freely combined with Motor Modules in booksize format for multi-axis applications with high total output.



SINAMICS S120 and SIMOTION – the perfect team

Modern machines must be capable of handling ever more complex Motion Control tasks and perform them with increasing accuracy and speed. In regards to this requirement, the SIMOTION Motion Control System and high-performance SINAMICS S120 drive system form a perfect team. The SIMOTION D variant, which is physically integrated in the SINAMICS S120 drive, is the ideal solution for machines with a large number of axes and stringent precision requirements. This distributed automation structure allows the machine to be segmented into various axis groupings, with each grouping controlled by a separate SIMOTION Motion Control System. The SIMOTION systems communicate either via PROFIBUS DP or PROFINET. Another important aspect: The compact machine design thanks to the distributed automation structure and a Control Unit directly in the drive.

Totally Integrated Automation – the unique automation platform

With Totally Integrated Automation (TIA), Siemens is the only single-source provider to offer an integrated spectrum of products and systems for all sectors. Tailored to meet individual customer requirements, sector-specific automation solutions can be implemented efficiently on the basis of TIA. Lower life-cycle costs for plant operation and a significant reduction in the time to market result in a marked improvement in productivity and greater investment security.

Easy – Totally Integrated Automation with SINAMICS S120

Apart from SIMATIC, SIMOTION and SINUMERIK, SINAMICS is also one of the core components of TIA. The STARTER commissioning tool is therefore an integral element of the TIA platform. It is thus possible to parameterize, program and commission all components in the automation system using a standardized engineering platform and without any gaps. The system-wide data management functions ensure consistent data and simplify archiving of the entire plant project.

PROFIBUS – the No. 1 fieldbus

PROFIBUS DP, the standard fieldbus of the TIA system, is supported by all SINAMICS S120 variants. It provides a high-performance, system-wide communication network which links all automation components: HMI, controls, drives and I/O devices.

PROFINET – for enhanced performance and open IT communication

SINAMICS S120 is also available with a PROFINET interface. This Ethernet-based bus enables control data to be exchanged at high speed via PROFINET IO with IRT or RT and makes SINAMICS S120 a suitable choice for integration in top-performance multi-axis applications.

At the same time, PROFINET also uses standard IT mechanisms (TCP/IP) to transport information, e.g. operating and diagnostic data, to higher-level systems. A SINAMICS S120 with this interface can thus easily be integrated into factory IT networks.

More information

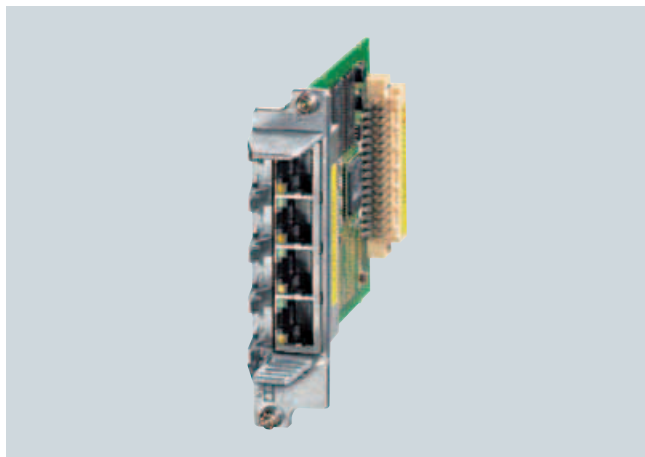
Further information regarding technical specifications and ordering data can be found in Catalog PM21: SINAMICS S120" as well as in the interactive catalog under "Drives Technology/ AC Converters/Low-Voltage Converters".

PROFINET/Industrial Ethernet

SINAMICS S120 Drive system

CBE20 Communication Board

Overview



The CBE20 Communication Board can be used to connect the SINAMICS S120 drive system to a PROFINET IO network via a CU320 Control Unit.

The SINAMICS S120 drive system then assumes the function of a PROFINET IO device and can perform the following functions:

- PROFINET IO device
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
 - RT (Real-Time)
 - IRT (Isochronous Real-Time), minimum send cycle 500 µs
- Connects to controls as PROFINET IO devices using PROFIdrive in accordance with Specification V4
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 4-port switch with four RJ45 sockets based on the PROFINET ASIC ERTEC400. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

Integration

The CBE20 Communication Board plugs into the option slot on the CU320 Control Unit.

Technical specifications

Order No.	6SL3055-0AA00-2EB0
Product type description	CBE20 Communication Board
Current requirement at 24 V DC	0.16 A
Ambient temperature, permissible	
• Storage and transport	-40 ... +70 °C (-40 ... +158 °F)
• Operation	0 ... 55 °C (32 ... 131 °F)
Dimensions	130 mm × 78 mm (5.12 in × 3.07 in)
Weight, approx.	76 g (2.68 oz)
Approvals	cULus (File No.: E164110)

Ordering data

Order No.	6SL3055-0AA00-2EB0
CBE20 Communication Board	

Accessories

The PROFINET cables and connectors listed below are recommended:

Industrial Ethernet FC

- RJ45 Plug 145 (1 unit)
- RJ45 Plug 145 (10 units)
- Stripping tool
- Standard Cable GP 2x2
- Flexible Cable GP 2x2
- Trailing Cable GP 2x2
- Trailing Cable 2x2
- Marine Cable 2x2

6GK1901-1BB30-0AA0
6GK1901-1BB30-0AB0
6GK1901-1GA00
6XV1840-2AH10
6XV1870-2B
6XV1870-2D
6XV1840-3AH10
6XV1840-4AH10

PROFINET/Industrial Ethernet

SINAMICS S120 Drive system

CU310 PN Control Unit

Overview



The CU310 PN Control Unit is designed for the communication and open-loop/closed-loop control functions of a Power Module. The CU310 PN combined with a Power Module and CompactFlash Card creates a powerful single-axis AC drive. The communication link to the higher-level control is provided by PROFINET IO.

Integration

The CU310 PN Control Unit drives Power Modules in blocksize format via the PM-IF interface. In this case, other DRIVE-CLiQ components such as Sensor or Terminal Modules can be connected to the DRIVE-CLiQ socket on the CU310 PN Control Unit.

Power Modules in chassis format are driven by the CU310 DP Control Unit via the DRIVE-CLiQ interface. With this option, Sensor and Terminal Modules must be connected to the free DRIVE-CLiQ sockets on the Power Module.

Parameter settings can be changed with the BOP20 Basic Operator Panel. The BOP20 panel can also be snapped onto the CU310 PN Control Unit during operation for diagnostic purposes.

The CU310 PN Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool. The CU310 PN Control Unit requires a CompactFlash Card with firmware version 2.4 or higher.

A CU310 PN Control Unit communicates with the higher-level control system using PROFINET IO and the PROFIdrive V4 profile.

The SINAMICS S120 drive system with CU310 PN then assumes the function of a PROFINET IO device and can perform the following functions:

- PROFINET IO device
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
 - RT (Real-Time)
 - IRT (Isochronous Real-Time), minimum send cycle 500 µs
- Connects to controls as PROFINET IO devices using PROFIdrive compliant with Specification V4
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 2-port switch with 2 RJ45 sockets based on the ERTEC ASIC. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

An external 24 V supply can be connected to the CU310 to power the Control Unit when the incoming supply to the Power Module is not energized.

Technical specifications

Order No.	6SL3040-0LA01-0AA1
Product type description	Control Unit CU310 PN
Current requirement at 24 V DC, max. without taking account of digital outputs and DRIVE-CLiQ supply	0.4 A for CU310 PN + 0.5 A for PM340 Power Module
Conductor cross-section, max.	2.5 mm ²
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1 4 x floating digital inputs 4 bidirectional non-floating digital inputs/digital outputs
Digital outputs (sustained-short-circuit-proof)	4 bidirectional non-floating digital inputs/digital outputs
Dimensions	
• Width	73 mm (2.87 in)
• Height	183.2 mm (7.21 in)
• Depth	89.6 mm (3.53 in)
Weight, approx.	0.95 kg (2 lb)

Ordering data

Ordering data	Order No.
CU310 PN Control Unit (without CompactFlash Card)	6SL3040-0LA01-0AA1
Accessories	
STARTER commissioning tool	6SL3072-0AA00-0AG0
Industrial Ethernet FC	
• RJ45 Plug 180 (1 unit)	6GK1901-1BB10-2AA0
• RJ45 Plug 180 (10 unit)	6GK1901-1BB10-2AB0
• Stripping tool	6GK1901-1GA00
• Standard Cable GP 2x2	6XV1840-2AH10
• Flexible Cable GP 2x2	6XV1870-2B
• Trailing Cable GP 2x2	6XV1870-2D
• Trailing Cable 2x2	6XV1840-3AH10
• Marine Cable 2x2	6XV1840-4AH10

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

SINAMICS G120 chassis units

Overview

The new SINAMICS G120 series of frequency inverters is designed to provide precise and cost-effective speed/torque control of AC motors.

With different device versions (frame sizes FSA to FSF) in a power range of 0.37 kW to 132 kW (0.5 hp to 200 hp), it is suitable for a wide variety of drive solutions.



Examples of SINAMICS G120, frame sizes FSA, FSB and FSC; each with Power Module, Control Unit and Basic Operator Panel



Examples of SINAMICS G120, frame sizes FSD, FSE and FSF; each with Power Module, Control Unit and Basic Operator Panel

Modularity

SINAMICS G120 is a modular converter system comprising a variety of functional units. The two main units are

- the Control Unit (CU) and
- the Power Module (PM)

The Control Unit controls and monitors the Power Module and the connected motor in several different modes. It supports communication with a local or central controller and monitoring devices.

The Power Module supplies the motor in the power range 0.37 kW to 132 kW (0.5 hp to 200 hp). The Power Module is controlled by a microprocessor in the Control Unit. It features state-of-the-art IGBT technology with pulse-width-modulated motor voltage and selectable pulse frequency. It also features a range of functions offering a high degree of protection for the Power Module and motor.

Furthermore, a large number of additional components is available, such as:

- Basic Operator Panel (BOP) for parameterizing, diagnosing, controlling, and copying drive parameters
- Line filter, classes A and B
- Line reactors
- Braking resistors
- Output reactors

Safety Integrated

The SINAMICS G120 inverter chassis units are available in a number of different variants for safety-oriented applications. All Power Modules are already designed for Safety Integrated. A Safety Integrated Drive can be created by combining a Power Module with the relevant Fail-safe Control Unit.

The SINAMICS G120 fail-safe frequency inverter provides four safety functions, certified in accordance with EN 954-1 Category 3 and IEC 61508 SIL 2:

- Safe torque off (STO) to protect against active movement of the drive
- Safe stop 1 (SS1) for continuous monitoring of a safe braking ramp
- Safely limited speed (SLS) for protection against dangerous movements on exceeding a speed limit
- Safe brake control (SBC) for driving motor brakes which are active in the de-energized state, e.g. motor holding brakes

The functions "Safe Stop 1" and "Safely limited speed" can both be implemented without a motor sensor or encoder; the implementation cost is minimal. Existing plants in particular can be updated with safety technology without the need to change the motor or mechanical system.

The safety functions "Safely limited speed" and "Safe stop 1" are certified for asynchronous motors without encoders - these safety functions are not permitted for pull-through loads as in the case of lifting gear and winders.

For further information, please refer to section Safety Integrated in chapter Innovations.

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

SINAMICS G120 chassis units

Overview (continued)

Efficient Infeed Technology

The advanced Efficient Infeed Technology is employed in PM250 and PM260 Power Modules. This technology allows the energy produced by motors operating in generator mode on standard inverters to be fed back into the supply system. The control cabinet can be designed even more compactly thanks to the omission of extra cooling equipment and components such as braking resistors, brake choppers and line reactors. The time and expense involved in planning and wiring the system are significantly reduced. At the same time, considerable savings can be achieved in terms of energy consumption and operating costs.

For further information, please refer to section Efficient Infeed Technology in chapter Innovations.

Innovative cooling concept and paint finish of electronic modules

The new cooling system and the paint finish for the electronic modules significantly increase the service life or useful life of the device. These features are based on the following principles:

- Disposal of all heat losses via an external heat sink
- Electronic modules not located in air duct
- Standardized convection cooling of Control Unit
- All cooling air from the fan is directed through the heat sink

STARTER commissioning tool

The STARTER commissioning tool supports the commissioning and maintenance of SINAMICS G120 inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allows you to commission the device quickly and easily.

Benefits

- Modularity ensures flexibility for an advanced drive concept
 - Module replacement when system is running (hot swapping)
 - Pluggable terminals
 - The modules can be easily replaced, which makes the system extremely service friendly.
- The safety functions make it easier to integrate drives into safety-oriented machines or plants
- Capable of communicating via PROFINET or PROFIBUS with PROFIdrive Profil 4.0
 - Reduced number of interfaces
 - Plant-wide engineering
 - Easy to handle
- The innovative circuit design (bidirectional input rectifier with "pared-down" DC link) allows the kinetic energy of a load to be fed back into the supply system when Power Modules PM250 and PM260 are implemented. This feedback capability provides enormous potential for savings because generated energy no longer has to be converted into heat in a braking resistor
- Innovative SiC semiconductor technology ensures that when a PM260 Power Module is used, the inverter is more compact than a comparable standard inverter with an optional LC filter for the same output.
- A new cooling concept and paint finish for the electronic modules increase robustness and service life
- Simple unit replacement and quick copying of parameters using the optional Basic Operator Panel or the optional MMC memory card
- Low-noise motor operation resulting from high pulse frequency
- Compact, space-saving construction
- Software parameters for easy adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- 2/3-wire control (static/pulsated signals) for universal control via digital inputs
- Engineering and commissioning with uniform engineering tools such as SIZER, STARTER, and Drive ES: ensure rapid engineering and easy commissioning – STARTER is integrated in STEP 7 with Drive ES Basic with all the advantages of central data storage and totally integrated communication
- Certified worldwide for compliance with CE, UL, cUL, C-tick, Safety Integrated IEC 61508 SIL 2

Application

SINAMICS G120 is ideal

- as a universal drive in all industrial and commercial applications
- in the automotive, textiles, printing, and chemical industries
- for end-to-end applications, e.g. in conveyor systems

Design

The SINAMICS G120 inverter chassis units are modular frequency inverters for standard drives. Each SINAMICS G120 comprises two operative units – the Power Module and Control Unit. Each Control Unit can be combined with each Power Module.

Guide for module selection

The steps to be taken for the selection of a complete SINAMICS G120 frequency inverter should be as follows:

1. Selection of the appropriate Control Unit (in dependence of the required style depth of communication, hardware and software)
2. Selection of the appropriate Power Module (in dependence of the necessary performance and technology)
3. Selection of the optional additional components. A large number of components for expanding the system is available (e. g. line-side power components, DC-link components, load-side power components, and supplementary system components). Please note that not every component is required for every Power Module (example: Braking resistors are not necessary for PM250 and PM260 Power Modules!). You can find the exact indications in the technical data tables of the respective components.

Control Units

The following Control Units and an MMC memory card are available as accessories for SINAMICS G120 inverter chassis units:

CU240 Control Units

The Control Unit performs closed-loop control functions for the inverter. In addition to control functions, the Control Unit can also perform other tasks which can be adapted to the relevant application by parameterization. A number of Control Units are available in different versions:

- CU240S PN
- CU240S PN-F

MMC memory card (not available for Control Unit CU240E)

The parameter settings for an inverter can be stored on the MMC memory card. When the plant is serviced, it is immediately ready for use again after, for example, replacement of the frequency inverter and transfer of the memory card data. The associated slot is located on top of the Control Unit.

Power Modules

The following Power Modules are available for SINAMICS G120 inverter chassis units:

PM240 Power Modules

PM240 Power Modules (0.37 kW to 90 kW) feature an integrated brake chopper and are designed for drives without energy recovery capability. Generator energy produced during braking is converted to heat via externally connected braking resistors.

PM250 Power Modules

PM250 Power Modules (7.5 kW to 132 kW) use an innovative circuit design which allows line-commutated energy recovery to the supply. This innovative circuit permits generator energy to be fed back into the supply system and therefore saves energy.

PM260 Power Modules

PM260 Power Modules (11 kW to 55 kW) also use an innovative circuit design which allows line-commutated energy recovery to the supply. This innovative circuit permits generator energy to be fed back into the supply system and, therefore, saves energy. The PM260 Power Modules also have an integrated sine-wave filter that limits the rate of rise of voltage and the capacitive charge/discharge currents usually associated with converter operation.

Line-side power components

The following line-side power components are available for SINAMICS G120 inverter chassis units:

Line filters

The Power Module complies with a higher radio interference class with one additional line filter.

Line reactors (for PM240 Power Modules only)

A line reactor reduces the system perturbations by harmonics. This is valid in particular for low power supplies (system fault level $u_k > 1\%$).

Recommended line components

This is a recommendation for further line-side components, such as fuses and circuit-breakers (line-side components must be dimensioned in accordance with IEC standards). Further information about the listed fuses and circuit-breakers can be found in Catalogs LV 1 and LV 1 T.

DC link components

The following DC-link components are available for SINAMICS G120 inverter chassis units:

Braking resistors (for PM240 Power Modules only)

Excess power in the DC link is dissipated via the braking resistor. The braking resistors are designed for use with PM240 Power Modules. They are equipped with an integrated brake chopper (electronic switch).

Load-side power components

The following load-side power components are available for SINAMICS G120 inverter chassis units. This means that during operation with output reactors or LC filters or sine-wave filters, longer, shielded motor cables are possible and the motor service life can be increased:

Output reactors (for PM240 Power Modules only)

Output reactors reduce the voltage loading on the motor windings. At the same time, the capacitive charge/discharge currents, which place an additional load on the power section when long motor cables are used, are reduced.

Sine-wave filter (available soon, not available for PM260 Power Modules)

Sine-wave filter limits the rate of rise of voltage and the capacitive charge/discharge currents usually associated with converter operation. An output reactor is not required.

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

SINAMICS G120 chassis units

Design (continued)

Available optional power and DC link components depending on the used Power Module

The following line-side power components, DC-link components and load-side power components are optionally available for the Power Modules in the corresponding frame sizes:

	Frame size					
	FSA	FSB	FSC	FSD	FSE	FSF
Power Module PM240 with integrated brake chopper						
Available frame sizes	•	•	•	•	•	•
Line-side power components						
Line filter Class A	U	F	F	F	F	F/S ³⁾
Line filter Class B	U	U	U	–	–	–
Line reactor	U	U	U	U	U	S
DC link components						
Brake resistor	U	U	S	S	S	S
Load-side power components						
Output reactor	U	U	U	S	S	S
Sinusoidal filter	Available soon	Available soon	Available soon	Available soon	Available soon	Available soon
Power Module PM250 with line-commutated regenerative feedback and integrated line filter Class A						
Available frame sizes	–	–	•	•	•	•
Line-side power components						
Line filter Class A	–	–	I	I	I	I
Line filter Class B	–	–	U	–	–	–
Line reactor ¹⁾	–	–	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾
DC link components						
Brake resistor ²⁾	–	–	– ²⁾	– ²⁾	– ²⁾	– ²⁾
Load-side power components						
Output reactor	–	–	U	S	S	S
Sinusoidal filter	–	–	Available soon	Available soon	Available soon	Available soon
Power Module PM260 with line-commutated regenerative feedback and integrated sinusoidal filter						
Available frame sizes	–	–	–	•	–	•
Line-side power components						
Line filter Class A	–	–	–	F	–	F
Line filter Class B	–	–	–	–	–	–
Line reactor ¹⁾	–	–	–	– ¹⁾	–	– ¹⁾
DC link components						
Brake resistor ²⁾	–	–	–	– ²⁾	–	– ²⁾
Load-side power components						
Output reactor	–	–	–	–	–	–
Sinusoidal filter	–	–	–	I	–	I

U = Base component

S = Lateral mounting

I = integrated

– = not possible

F = Power Modules available without and with integrated filter Class A

¹⁾ In connection with a PM250 or PM260 Power Module a line reactor is not necessary and may not be used.

²⁾ In connection with a PM250 or PM260 Power Module a line conducted regenerative feedback is carried out. A brake resistor cannot be connected and is not necessary.

³⁾ PM240 FSF Power Modules from 110 kW (150 hp) on are only available without integrated filter Class A. Therefore an optional line filter Class A is available for lateral mounting.

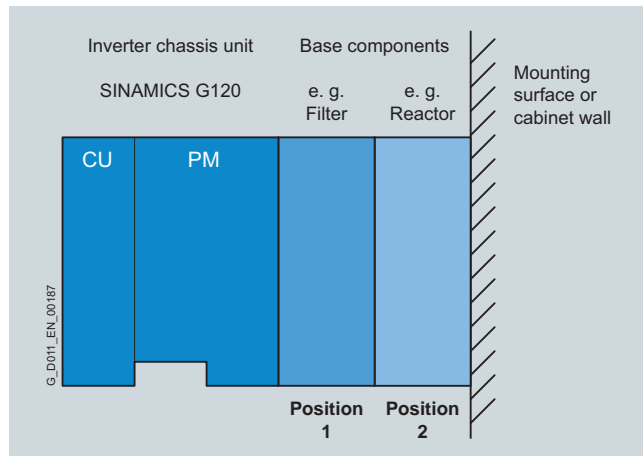
PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

SINAMICS G120 chassis units

Design (continued)

General information on design



Frequency converters, consisting of Power Module (PM) and Control Unit (CU) and two base components at positions 1 and 2

- Max. two base components plus converter are possible.
- The line filter has to be mounted directly underneath the frequency inverter (position 1).
- With lateral mounting, the line-side components have to be mounted on the left-hand side of the frequency inverter and the load-side components on the right-hand side.
- Brake resistors have to be mounted directly on the control cabinet wall due to heating issues.

2

Recommended installation combinations of converter and optional power and DC link components

Power Module Frame size	Base component		Lateral mounting	
	Position 1	Position 2	On the left side of the converter (for line-side power components)	On the right side of the converter (for output-side power components and DC link components)
FSA and FSB	Line filter	Line reactor	–	Output reactor and/or brake resistor
	Line filter or line reactor	Output reactor	–	Brake resistor
	Line filter or line reactor	Brake resistor	–	–
	Line filter or line reactor or brake resistor	–	–	–
FSC	Line filter	Line reactor	–	Output reactor and/or brake resistor
	Line filter or line reactor	Output reactor	–	Output reactor and/or brake resistor
FSD and FSE	Line reactor	–	Line filter	Output reactor and/or brake resistor
FSF	–	–	Line filter and/or line reactor	Output reactor and/or brake resistor

Supplementary system components

The following supplementary system components are available for SINAMICS G120 inverter chassis units:

Basic Operator Panel BOP

The Basic Operator Panel BOP can be plugged onto the Control Unit and can be used to commission drives, monitor drives in operation and input individual parameter settings. The BOP also provides a function for a quick copying of parameters.

PC inverter connection kit

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool) has been installed.

The STARTER commissioning tool is supplied with the PC inverter connection kit on DVD.

Brake Relay

The Brake Relay allows the Power Module to be connected to an electromechanical motor brake, thereby allowing the motor brake to be driven directly by the Control Unit.

Safe Brake Relay

The Safe Brake Relay allows the Power Module to be connected to an electromechanical motor brake, allowing the brake to be directly and safely controlled by the Control Unit in accordance with EN 954-1, safety category 3 and IEC 61508 SIL 2.

Adapter for mounting on DIN rails

The adapter for DIN rail attachment can be used to mount inverters of frame sizes FSA and FSB on DIN rails (2 units with a center-to-center distance of 100 mm).

Shield connection kit

The shield connection kit makes it easier to bond the shields of supply and control cables, offers mechanical strain relief and thus ensures optimum EMC performance.

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

SINAMICS G120 chassis units

Configuration

The following electronic configuration and engineering tools are available for SINAMICS G120 inverter chassis units:

SD configurator selection aid within the CA 01

The interactive catalog CA 01 – the offline mall of Siemens Automation and Drives (A&D) – contains over 100000 products with approximately 5 million potential drive system product variants. The SD configurator has been developed to facilitate selection of the correct motor and/or inverter from the wide spectrum of Standard Drives products. The configurator is integrated in this catalog with the selection and configuration tools as a "selection help" on CD 2 "Configuring".

SIZER configuration tool

The SIZER PC tool provides an easy-to-use means of configuring the SINAMICS and MICROMASTER 4 drive family. It provides support when setting up the technologies involved in the hardware and firmware components required for a drive task. SIZER supports the complete configuration of the drive system, from simple individual drives to complex multi-axis applications.

STARTER commissioning tool

The STARTER commissioning tool provides menu-guided assistance with commissioning, optimization and diagnostics. STARTER is not only designed for use on SINAMICS drives but also for MICROMASTER 4 units and frequency inverters for the distributed I/Os SIMATIC ET 200S FC and SIMATIC ET 200pro FC.

Drive ES engineering system

Drive ES is the engineering system used to integrate Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively in terms of communication, configuration and data management. The STEP 7 Manager user interface provides the basis for this procedure. A variety of software packages, i.e. Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7, is available for SINAMICS.

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for the following components of the SINAMICS G120 inverter chassis unit.

Product type description	SINAMICS G120
Mechanical data	
Vibratory load	
• Transport ¹⁾	Class 2M3 to EN 60068-2-6
• Operation	Class 3M4 to EN 60068-2-6 10 ... 58 Hz: Constant deflection 0.075 mm 58 ... 200 Hz: Constant acceleration = 9.81 m/s ² (1 g)
Shock load	
• Transport ¹⁾	Class 2M2 to EN 60068-2-27
• Operation	Class 3M4 to EN 60068-2-27 49 m/s ² (5 g)/30 ms
Ambient conditions	
Protection class	Class I (with protective conductor system) and class III (PELV) to EN 61800-5-1
Shock protection	according to EN 61800-5-1 when used properly
Permissible ambient and coolant temperature (air) during operation for line-side power components and Power Modules	
• High overload (HO)	-10 ... +50 °C (14 ... 122 °C) without derating, > 50 ... 60 °C, see derating characteristics
• Light overload (LO)	-10 ... +40 °C (14 ... 104 °C) without derating, > 40 ... 60 °C, see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units, additional system components and DC-link components	-10 ... +50 °C (14 ... 122 °F) with CU240S DP-F: 0 ... 45 °C with CU240S PN-F: 0 ... 40 °C up to 2000 m above sea level
Climatic ambient conditions	
• Storage ¹⁾	Class 1K3 to EN 60721-3-1 Temperature -25 ... +55 °C
• Transport ¹⁾	Class 2K4 to EN 60721-3-2 Temperature -40 ... +70 °C Max. air humidity 95 % at 40 °C
• Operation	Class 3K5 to EN 60721-3-3 Condensation, splashwater and ice formation are not permitted (EN 60204, Part 1)
Environmental class/harmful chemical substances	
• Storage ¹⁾	Class 1C2 to EN 60721-3-1
• Transport ¹⁾	Class 2C2 to EN 60721-3-2
• Operation	Class 3C2 to EN 60721-3-3
Organic/biological influences	
• Storage ¹⁾	Class 1B1 to EN 60721-3-1
• Transport ¹⁾	Class 2B1 to EN 60721-3-2
• Operation	Class 3B1 to EN 60721-3-3
Degree of contamination	2 to EN 61800-5-1

¹⁾ In transport packaging.

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

SINAMICS G120 chassis units

Technical specifications (continued)

Standards	
Standards conformance	UL, cUL, CE, c-tick
CE mark	To Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EEC
EMC directive	
• Frame sizes FSA to FSF without integrated line filter class A	Category C3 ²⁾ to EN 61800-3
• Frame sizes FSB to FSF with integrated line filter class A	Category C2 ³⁾ to EN 61800-3 (corresponds to class A to EN 55011 for conducted interference)
• Frame size FSA without integrated line filter and with additional line filter class A	Category C2 ³⁾ to EN 61800-3 (corresponds to class A to EN 55011 for conducted interference)
• Frame sizes FSA with additional line filter class A and with additional line filter class B	Category C2 ³⁾ to EN 61800-3 (corresponds to class B to EN 55011 for conducted interference)
• Frame sizes FSB and FSC with additional line filter class A and with additional line filter class B	Category C2 ³⁾ to EN 61800-3 (corresponds to class B to EN 55011 for conducted interference)

Note:

The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter. The frequency inverters on their own do not generally require identification according to the EMC directive.

²⁾ Unfiltered inverters can be used in industrial environments as long as they are installed in a system that contains line filters on the higher-level infeed side. Then a PDS (Power Drive System) Category C3 can be installed.

³⁾ With shielded motor cable up to 25 m.

Compliance with standards

CE mark

The SINAMICS G120 inverters meet the requirements of the Low-Voltage Directive 73/23/EEC.

Low-voltage directive

The inverters comply with the following standards listed in the EU gazette:

- EN 60204
Safety of machinery, electrical equipment of machines
- EN 61800-5-1
Electrical power drive systems with variable speed – Part 5-1: Requirements regarding safety – electrical, thermal, and energy requirements

UL listing

Converter devices in UL category NMMS certified to UL and cUL, in compliance with UL508C. UL list numbers E121068 and E192450.

For use in environment with pollution degree 2.

Additional information can be found in the Internet under:

<http://www.ul.com>

Machine directive

The devices are suitable for installation in machines. Compliance with the machine directive 98/37/EEC requires a separate certificate of conformity. This must be provided by the plant constructor or the installer of the machine.

EMC directive

- EN 61800-3
Variable-speed electric drives
Part 3: EMC product standard including specific test methods

The modified EMC product standard EN 61800-3 for electrical drive systems is valid since 07/01/2005. The transition period for the predecessor standard EN 61800-3/A11 from February 2001 ended on October 1, 2007. The following information applies to the SINAMICS G120 frequency inverters from Siemens AG:

- The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter.
- Frequency inverters are normally only supplied to experts for installation in machines or systems. A frequency inverter must, therefore, only be considered as a component which, on its own, is not subject to the EMC product standard EN 61800-3. The inverter's Instruction Manual, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to a PDS. The EMC directive in the EU is complied with for a PDS by observance of the product standard EN 61800-3. The frequency inverters on their own do not generally require identification according to the EMC directive.

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

SINAMICS G120 chassis units

Technical specifications (continued)

- In the new EN 61800-3 of July 2005, a distinction is no longer made between "general availability" and "restricted availability". Instead, different categories have been defined, C1 to C4, in accordance with the environment of the PDS at the operating site:
 - **Category C1:** Drive systems for rated voltages < 1000 V for use in environment 1
 - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in environment 1, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning is required.
 - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use in the second environment. A warning is required.
 - **Category C4:** Drive systems for rated voltages ≥ 1000 V, for rated currents ≥ 400 A, or for use in complex systems in environment 2. An EMC plan must be created.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for "environment 2" (= industrial power supply systems that do not supply households). These limit values are below the limit values of filter class A to EN 55011. Unfiltered inverters can be used in industrial environments as long as they are installed in a system that contains line filters on the higher-level infeed side.
- With SINAMICS G120 Power Drive Systems (PDS) that fulfill EMC product standard EN 61800-3 can be set up upon following the setup instructions.
- A differentiation must be made between the product standards for electrical drive systems (PDS) of the range of standards EN 61800 (of which Part 3 covers EMC topics) and the product standards for the devices/systems/machines, etc. This will probably not result in any changes in the practical use of frequency inverters. Since frequency inverters are always part of a PDS and these are part of a machine, the machine manufacturer must observe various standards depending on their type and environment (e.g. EN 61000-3-2 for line harmonics and EN 55011 for radio interference). The product standard for PDS on its own is, therefore, either insufficient or irrelevant.
- Regarding the compliance of limit values for line harmonics, EMC product standard EN 61800-3 for PDS refers to compliance with EN 61000-3-2 and EN 61000-3-12.
- Regardless of the configuration with SINAMICS G120 and its components, the mechanical engineer can also implement other measures to ensure that the machine complies with the EU EMC directive. The EU EMC directive is generally fulfilled when the relevant EMC product standards are observed. If they are not available, the generic standards (e.g. DIN EN 61000-x-x) can be used instead. It is important that the conducted and emitted interferences at the line connection point and outside the machine remain below the relevant limit values. Any suitable technical means can be used to ensure this.

More information

Further information on technical specifications and ordering data can be found in Catalog D11.1 "SINAMICS G110/G120 Built-in Devices and SINAMICS 120D Distributed Frequency Converter" as well as in the interactive catalog under "Drives Technology/AC Converters/Low-Voltage Converters" for "SINAMICS G110/G120 Built-in Devices and SINAMICS 120D Distributed Frequency Converter".

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

CU240S PN and CU240S PN-F
Control Units

Overview



Example of CU240S DP-F Control Unit

The Control Unit performs closed-loop control functions for the inverter. In addition to control functions, the Control Unit can also perform other tasks which can be adapted to the relevant application by parameterization. A number of Control Units are available in different versions:

- CU240S PN
- CU240S PN-F

Selection and ordering data

Communication	Digital inputs Standard	Digital inputs Fail-safe	Digital outputs	Encoder interfaces	Designation	Control Unit Order No.
Standard						
PROFINET	9	–	3	1	CU240S PN	6SL3244-0BA20-1FA0
Fail-safe for Safety Integrated						
PROFINET	6	2	3	1	CU240S PN-F	6SL3244-0BA21-1FA0

Safety Integrated functions

The following Safety Integrated functions are integrated in the CU240S DP-F and CU240S PN-F Control Units and, with the exception of the Safe Brake Control (SBC), can be implemented without external circuit elements:

The SINAMICS G120 fail-safe frequency inverter provides four safety functions, certified in accordance with EN 954-1 Category 3 and IEC 61508 SIL 2:

- Safe Torque Off (STO) to protect against active movement of the drive
- Safe Stop 1 (SS1) for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS) for protection against dangerous movements on exceeding a speed limit
- Safe Brake Control (SBC) for driving motor brakes which are active in the de-energized state, e.g. motor holding brakes

The functions "Safe Stop 1" and "Safely limited speed" can both be implemented without a motor sensor or encoder; the implementation cost is minimal. Existing plants in particular can be updated with safety technology without the need to change the motor or mechanical system.

The safety functions "Safely limited speed" and "Safe stop 1" are certified for asynchronous motors without encoders - these safety functions are not permitted for pull-through loads as in the case of lifting gear and winders.

Design

CU240S PN and CU240S PN-F Control Units



Example: Example of CU240S PN-F Control Unit (right without terminal cover, with plug-in terminals)

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

CU240S PN and CU240S PN-F Control Units

Design (continued)

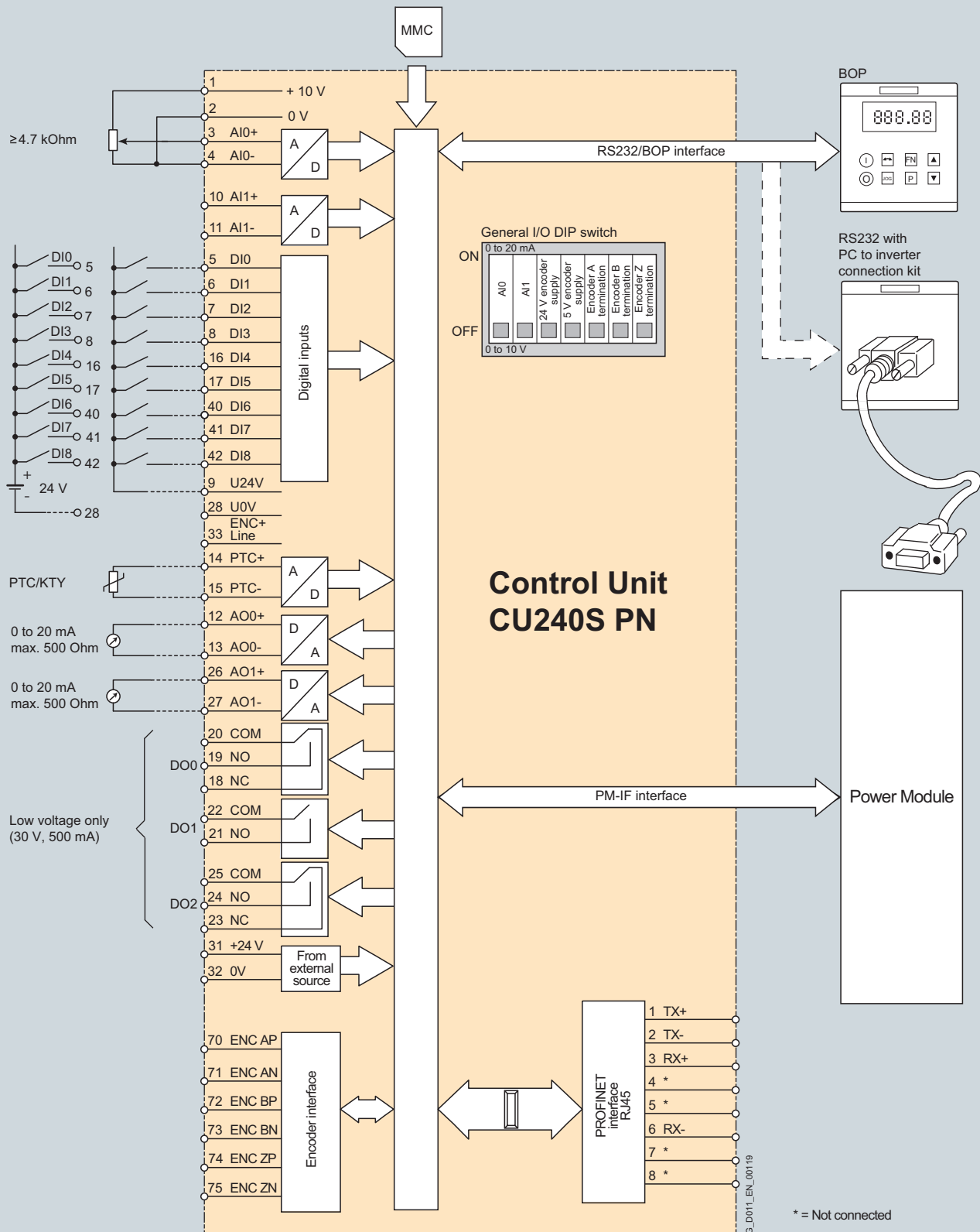
Terminal No.	Signal	Features
Digital inputs (DI) – standard		
5 ... 8, 16, 17	DI0 ... DI5	Freely programmable (isolated) 5.5 mA/24 V
40 ... 42 (with CU240S, CU240S DP, and CU240S PN only)	DI6 ... DI8	Freely programmable (isolated) 5.5 mA/24 V
Digital inputs (DI) – Fail-safe (for CU240S DP-F and CU240S PN-F only)		
60 ... 63 (for CU240S DP-F and CU240S PN-F only)	FDI0A FDI0B FDI1A FDI1B	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA / 24 V
Digital outputs (DO)		
18	DO0, NC	Relay output 1 NC contact (0.5 A, 30 V DC)
19	DO0, NO	Relay output 1 NO contact (0.5 A, 30 V DC)
20	DO0, COM	Relay output 1 Common contact (0.5 A, 30 V DC)
21	DO1, NO	Relay output 2 NO contact (0.5 A, 30 V DC)
22	DO1, COM	Relay output 2 Common contact (0.5 A, 30 V DC)
23	DO2, NC	Relay output 3 NC contact (0.5 A, 30 V DC)
24	DO2, NO	Relay output 3 NO contact (0.5 A, 30 V DC)
25	DO2, COM	Relay output 3 Common contact (0.5 A, 30 V DC)
Analog inputs (AI)		
3	AI0+	0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V or 0/4 ... 20 mA
4	AI0-	
10	AI1+	0 ... 10 V, 0 ... 20 mA
11	AI1-	
Analog outputs (AO)		
12	AO0+	Freely programmable (0/4 ... 20 mA with max. 500 Ω, 0/2 ... 10 V with min. 500 Ω)
13	AO0-	
26	AO1+	Freely programmable (0/4 ... 20 mA with max. 500 Ω) M (GND)
27	AO1-	
Encoder interface		
70	ENC AP	Encoder AP – channel A non-negating input
71	ENC AN	Encoder AN – channel A negating input
72	ENC BP	Encoder BP – channel B non-negating input
73	ENC BN	Encoder BN – channel B negating input
74	ENC ZP	Encoder ZP – zero pulse non-negating input
75	ENC ZN	Encoder ZN – zero pulse negating input
PTC/KTY interface		
14	PTC+	Positive PTC/KTY input
15	PTC-	Negative PTC/KTY input
Power supply		
33	ENC+ supply	Isolated encoder power supply (+24 V with 100 mA, +5 V with 300 mA), configured via DIP switches
9	U 24 V	Isolated user power supply +24 V with 100 mA
28	U 0 V	Isolated encoder power supply and user reference voltage
1	+10 V	Non-isolated, stabilized 10 V power supply for I/O – max. 10 mA
2	0 V	Power supply reference
31	+24 V	24 V power supply input
32	0 V	24 V power supply reference

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

CU240S PN and CU240S PN-F
Control Units

Design (continued)



Connection diagram for CU240S PN Control Unit

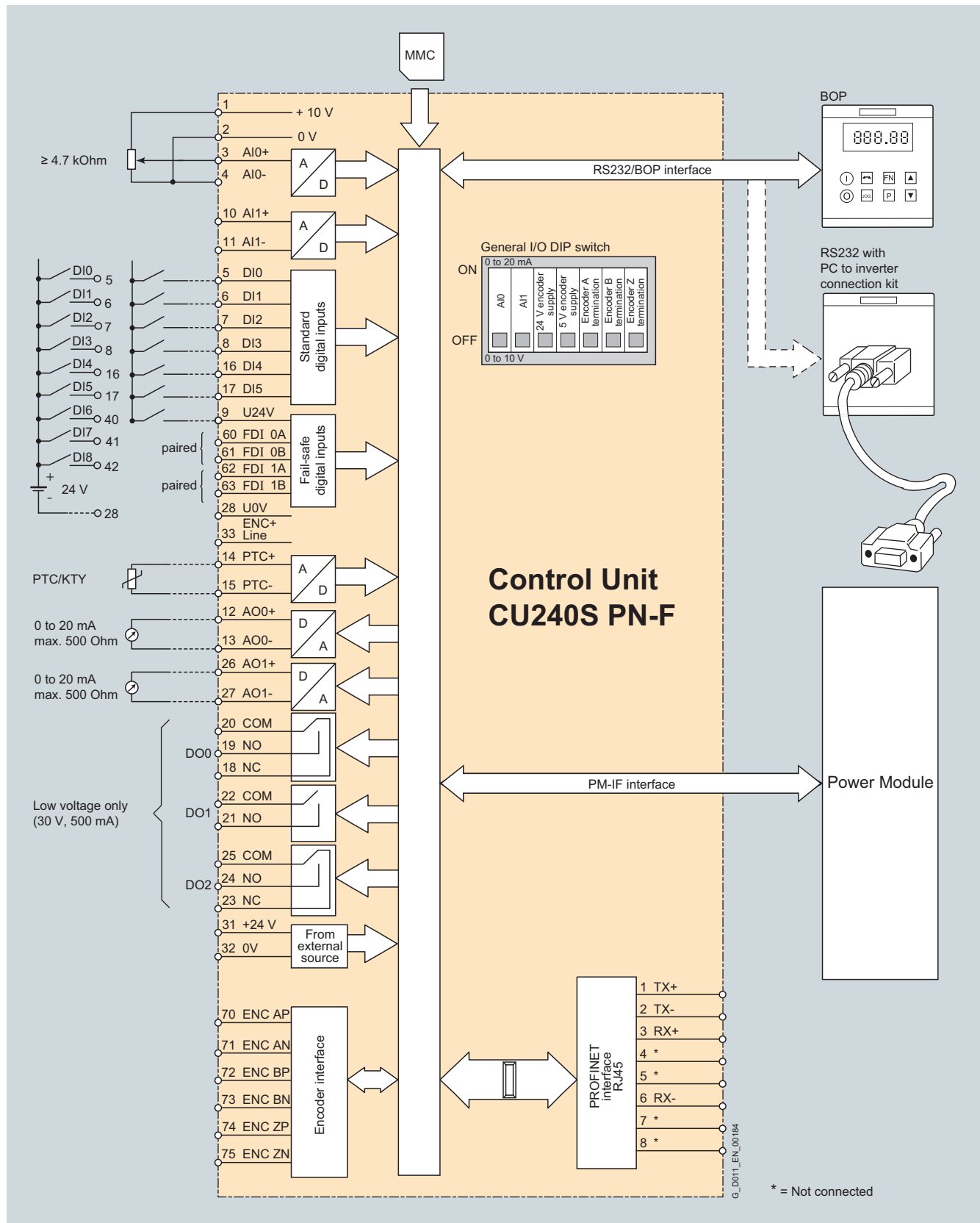
PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

CU240S PN and CU240S PN-F Control Units

Design (continued)

2



Connection diagram for CU240S PN-F Control Unit

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

CU240S PN and CU240S PN-F
Control Units

2

Technical specifications

Product type description	CU240S PN Control Unit 6SL3244-0BA20-1FA0	CU240S PN-F Control Unit 6SL3244-0BA21-1FA0
Electrical data		
Operating voltage	24 V DC via the Power Module or an external 24 V DC supply	24 V DC via the Power Module or an external 24 V DC supply
Power loss	< 40 W	< 40 W
Interfaces		
Digital inputs – standard	9	6
Digital inputs – Fail-safe	–	2
Digital outputs	3	3
Analog inputs	2	2
	Both analog inputs can be configured as supplementary digital inputs if an additional function is required. Switching thresholds: 0 → 1: Rated voltage 2 V 1 → 0: Rated voltage 0.8 V Analog inputs are protected against inputs in a voltage range of ± 30 V and have a common-mode voltage in the ± 15 V range.	
Analog outputs	2	2
	Analog outputs have short-circuit protection, but are not isolated. Maximum output voltage = 10 V in current mode, maximum output current = 20 mA in voltage mode. The reaction time should equal approximately 1 ms with a load of maximum 10 k Ω in voltage mode.	
Bus interface	PROFINET	PROFINET, PROFIsafe
Encoder interfaces	1	1
PTC/KTY interface	✓	✓
Brake Relay interface / Safe Brake Relay interface (connection via Power Module)	✓	✓
MMC memory card slot	✓	✓
RS232/USS interface (connection via PC-inverter connection kit)	✓	✓
Safety functions		
Integral safety functions to Category 3 of EN 954-1 and SIL2 of IEC 61508	–	<ul style="list-style-type: none"> • Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Brake Control (SBC) • Safe Torque Off (STO)
Open-loop and closed-loop control functions		
V/f linear/quadratic/parameterizable	✓	✓
V/f with flux current control (FCC)	✓	✓
Vector control, encoderless	✓	✓
Vector control with encoder	✓	✓
Torque control, encoderless	✓	✓
Torque control with encoder	✓	✓

PROFINET/Industrial Ethernet

SINAMICS G120 Drive system

CU240S PN and CU240S PN-F Control Units

Technical specifications (continued)

Product type description	CU240S PN Control Unit 6SL3244-0BA20-1FA0	CU240S PN-F Control Unit 6SL3244-0BA21-1FA0
Software functions		
Fixed frequencies	16, programmable	16, programmable
Signal interconnection with BICO technology	✓	✓
Automatic restart following line failure or operation fault	✓	✓
Positioning deceleration ramp	✓	✓
Slip compensation	✓	✓
Free function blocks (FFB) for logic and arithmetic operations	✓	✓
Ramp smoothing	✓	✓
3 switchable drive data sets	✓	✓
3 switchable command data sets (CDS) (manual/auto)	✓	✓
Flying restart	✓	✓
JOG	✓	✓
Technology controller (PID)	✓	✓
Thermal motor protection	✓	✓
Thermal inverter protection	✓	✓
Setpoint specification	✓	✓
Motor identification	✓	✓
Motor holding brake	✓	✓
V _{dcm} controller	✓ (with PM240 only)	✓ (with PM240 only)
Kinetic buffering	✓ (with PM240 only)	✓ (with PM240 only)
Braking functions	✓ (with PM240 only)	✓ (with PM240 only)
• DC injection braking		
• Compound braking		
• Dynamic braking with integrated brake chopper		
Mechanical specifications and environmental operating conditions		
Degree of protection	IP20	IP20
Signal cable cross-section		
• min.	0.05 mm ² (AWG30)	0.05 mm ² (AWG30)
• max.	2 mm ² (AWG14)	2 mm ² (AWG14)
Operating temperature	-10 ... +50 °C (14 ... 122 °F)	0 ... 40 °C (32 ... 104 °F)
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	< 95 % RH, non-condensing	< 95 % RH, non-condensing
Dimensions		
• Width	73 mm	73 mm
• Height	177 mm	177 mm
• Depth	63 mm	63 mm
Weight, approx.	0.52 kg	0.52 kg

PROFINET/Industrial Ethernet

SINAMICS G120D Distributed Frequency Inverters

SINAMICS G120D distributed frequency inverter

Overview



Example: SINAMICS G120D, frame size FSA, comprising Power Module PM250D and fail-safe Control Unit CU240D DP-F

The new SINAMICS G120D distributed frequency inverter series is the solution for demanding drive tasks especially in the field of conveyor systems. SINAMICS G120D supports bump-free, closed-loop speed control of three-phase asynchronous motors and fulfills all the requirements of conveyor system applications from simple frequency control through to demanding vector control. With its well-thought-out modular type of construction to the degree of protection IP65, it is seamlessly integrated into the plant and supports a high plant availability and minimized spare parts inventories. The innovative power module concept with regenerative feedback capability helps to save energy. Safety functions that are unique worldwide support enhanced plant concepts with increased productivity. This drive can be optimally integrated into the Siemens TIA world of automation via PROFIBUS or PROFINET.

With different device versions (frame sizes FSA to FSC) in an output range of 0.75 kW to 7.5 kW (1.0 hp to 10 hp), it is suitable for a wide variety of drive solutions.

Reasons for using distributed drive systems

- Modular drive solutions providing standardized mechatronic elements that can be individually tested
- No need for a control cabinet, resulting in a smaller space requirement and less air-conditioning
- Long cables between the inverter and motor can be avoided (which means lower output losses, reduced interference emission and lower costs for shielded cables and additional filters)
- Distributed configurations offer considerable benefits for conveyor systems with their extensive coverage (e.g. in the automotive and logistics sectors)

Modularity

SINAMICS G120D is a modular inverter system to degree of protection IP65 comprising a variety of functional units. The two main units are

- Control Unit (CU)
- Power Module (PM)

The Control Unit controls and monitors the Power Module and the connected motor in several different control modes. The digital inputs and digital outputs on the device support the simple wiring of sensors and actuators directly on the drive. The input signals can either be directly linked within the Control Unit and trigger local responses automatically or they can be transferred to the central controller via PROFIBUS or PROFINET for processing within the context of the overall plant.

The Power Module supplies the motor in the power range 0.75 kW to 7.5 kW (1.0p to 10 hp). The Power Module is controlled by a microprocessor in the Control Unit. State-of-the-art IGBT technology with pulse-width-modulation is used for highly reliable and flexible motor operation. It also features a range of functions offering a high degree of protection for the Power Module and motor. The unusually slimline type of construction is optimized for use directly in the plant. The Power Module also has the same drilling template for all outputs (constant footprint).

Safety Integrated

The SINAMICS G120D distributed frequency inverters are available in a number of different variants for safety-oriented applications. All Power Modules are already designed for Safety Integrated. A Safety Integrated Drive can be created by combining a Power Module with the relevant Fail-safe Control Unit.

The SINAMICS G120D fail-safe frequency inverter provides three safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- Safe Torque Off (STO) to protect against active movement of the drive
- Safe Stop 1 (SS1) for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS) for protection against dangerous movements on exceeding a speed limit

The functions "Safe Stop 1" and "Safely limited speed" can both be implemented without a motor sensor or encoder; the implementation cost is minimal. Existing plants in particular can be updated with safety technology without the need to change the motor or mechanical system.

The safety functions "Safely limited speed" and "Safe stop 1" are certified for asynchronous motors without encoders - these safety functions are not permitted for pull-through loads as in the case of lifting gear and winders.

For further information, please refer to section Safety Integrated in chapter Innovations.

Efficient Infeed Technology

The advanced Efficient Infeed Technology is employed in PM250D Power Modules. This technology allows the energy produced by motors operating in generator mode on standard inverters to be fed back into the supply system. At the same time, considerable savings can be achieved in terms of energy consumption and operating costs.

For further information, please refer to section Efficient Infeed Technology in chapter Innovations.

STARTER commissioning tool

The STARTER commissioning tool (STARTER Version 4.1, SP1 and higher) supports the commissioning and maintenance of SINAMICS G120D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

PROFINET/Industrial Ethernet

SINAMICS G120D Distributed Frequency Inverters

SINAMICS G120D distributed frequency inverter

Benefits

- Compact and space-saving design with slimline type of construction and identical drilling template for all outputs
- Wide output range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp).
- The safety functions make it easier to integrate drives into safety-oriented machines or plants
- The innovative circuit design (bidirectional input rectifier with "pared-down" DC link) allows the kinetic energy of a load to be fed back into the supply system. This feedback capability provides enormous savings because generated energy no longer has to be converted into heat in a braking resistor. Braking resistors and reactors are not necessary - this is a particular advantage in terms of the space requirement and installation costs for the high IP65 degree of protection.
- Enhanced ruggedness and longer service life due to coating of the electronic modules
- Flexibility due to modularity for a future-oriented distributed drive concept to the high IP65 degree of protection
 - Module replacement when system is running (hot swapping)
 - The modules can be easily replaced, which makes the system extremely service friendly.
- Capable of communicating via PROFINET or PROFIBUS with PROFIdrive Profile 4.0
 - Reduced number of interfaces
 - Plant-wide engineering
 - Easy to handle
- The ability to connect up to six sensors and up to two actuators directly to the Control Unit means that almost all drive information can be directly managed; local preprocessing of the signals takes the load off the fieldbus at a high and reproducible response time.
- Integrated EMC filter of class A (according to EN 55011), integrated braking control (400 V 1 AC rectified, corresponds to 180 V DC) and integrated motor protection due to thermal motor model and evaluation of PTC or KTY 84 temperature sensors
- Software parameters for easy adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- Easy replacement of devices and time-saving copying of parameters with the optional MMC memory card
- Engineering and commissioning with uniform engineering tools such as SIZER (Version 2.9 and higher), STARTER (Version 4.1, SP1 and higher) and Drive ES: Ensure rapid engineering and easy commissioning – STARTER is integrated in STEP 7 with Drive ES Basic with all the advantages of central data storage and totally integrated communication
- Certified worldwide for compliance with CE, UL, cUL, C-tick and Safety Integrated according to EN 954-1, Cat. 3 and IEC 61508 SIL 2

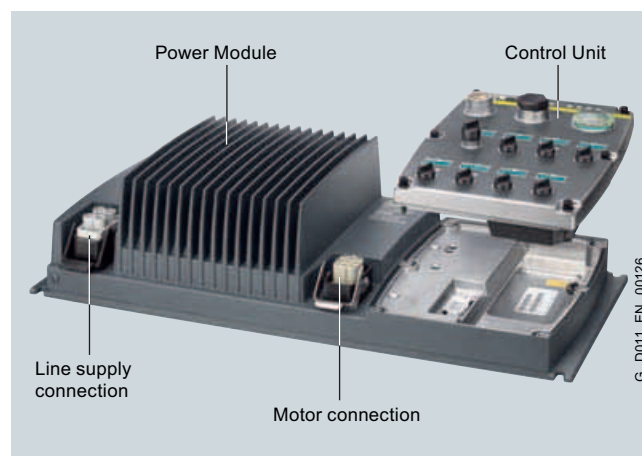
Application

SINAMICS G120D is ideally suited for demanding conveyor system applications in the industrial environment for which a distributed drive with communications capability is required. This applies in particular to the automotive sector, e.g. assembly lines.

SINAMICS G120D is also suitable for further high-performance applications, e.g. in the airport sector, food and beverages industry (without tensides) and in distribution logistics (e.g. mono-rail overhead conveyors).

Design

The SINAMICS G120D distributed frequency inverters are modular frequency inverters for standard drives. Each SINAMICS G120D comprises two operative units – the Power Module and Control Unit.



Power Module PM250D with line and motor connections and Control Unit CU240D

Power Modules

The following Power Modules are available for SINAMICS G120D distributed frequency inverters:

PM250D Power Modules

PM250D Power Modules (0.75 kW to 7.5 kW) use an innovative circuit design which allows line-commutated energy recovery to the supply. This innovative circuit permits generator energy to be fed back into the supply system and, therefore, saves energy.

Accessories

Connector sets for line infeed and the outgoing motor feeder are available as accessories as well as pre-assembled motor cables for connection to the motor.

PROFINET/Industrial Ethernet

SINAMICS G120D Distributed Frequency Inverters

SINAMICS G120D distributed frequency inverter

Design (continued)

Control Units

Control Units

The following Control Units are available for SINAMICS G120D distributed frequency inverters:

CU240D Control Units

The Control Unit performs closed-loop control functions for the inverter. In addition to control functions, the Control Unit can also perform other tasks which can be adapted to the relevant application by parameterization. A number of Control Units are available in different versions:

- CU240D PN
- CU240D PN-F

Accessories

- MMC memory card

The parameter settings for an inverter can be stored on the MMC memory card. When the plant is serviced, it is immediately ready for use again after, for example, replacement of the frequency inverter and transfer of the memory card data. The associated slot is located on the rear of the Control Unit.

- RS232 interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC if the appropriate software (commissioning tool STARTER Version 4.1, SP1 and higher) has been installed.

- Spare parts kit

A spare parts kit is available which comprises small parts such as seals, cover caps, PROFIBUS address windows and screws.

- Connecting cable

Flexible connecting cables for data transfer between Industrial Ethernet participants or PROFIBUS participants, as well as for power supply of the Control Unit.

Configuration

The following electronic configuration and engineering tools are available for SINAMICS G120D distributed frequency inverters:

SD configurator selection aid within the CA 01

The interactive catalog CA 01 – the offline mall of Siemens Automation and Drives (A&D) – contains over 100000 products with approximately 5 million potential drive system product variants. The SD configurator has been developed to facilitate selection of the correct motor and/or inverter from the wide spectrum of Standard Drives products. The configurator is integrated in this catalog with the selection and configuration tools as a "selection guide" on CD 2 "Configuring".

SIZER configuration tool

The SIZER PC tool provides an easy-to-use means of configuring the SINAMICS and MICROMASTER 4 drive family. It provides support when setting up the technologies involved in the hardware and firmware components required for a drive task. SIZER supports the complete configuration of the drive system, from simple individual drives to complex multi-axis applications. For SINAMICS G120D as from SIZER Version 2.9.

STARTER commissioning tool

The STARTER commissioning tool provides menu-guided assistance with commissioning, optimization and diagnostics. STARTER is not only designed for use on SINAMICS drives but also for MICROMASTER4 units and frequency inverters for the distributed I/O SIMATIC ET 200S FC and SIMATIC ET 200pro FC. For SINAMICS G120D from STARTER Version 4.1, SP1.

Drive ES engineering system

Drive ES is the engineering system used to integrate Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively in terms of communication, configuration and data management. The STEP 7 Manager user interface provides the basis for this procedure. A variety of software packages, i.e. Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7, is available for SINAMICS.

PROFINET/Industrial Ethernet

SINAMICS G120D Distributed Frequency Inverters

SINAMICS G120D distributed frequency inverter

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for the following components of the distributed SINAMICS G120D frequency inverters.

Product type description	SINAMICS G120D
Mechanical data	
Vibratory load	
• Transport ¹⁾	EN 60068-2-6 5 ... 9 Hz: Constant deflection 3.1 mm 9 ... 200 Hz: Constant acceleration = 9.81 m/s ² (1 g)
• Operation	EN 60068-2-6 10 ... 58 Hz: Constant deflection 0.15 mm 58 ... 200 Hz: Constant acceleration = 19.62 m/s ² (2 g)
Shock load	
• Transport ¹⁾	EN 60068-2-27 147.15 m/s ² (15 g)/11 ms; 3 shocks in each axis and direction
• Operation	EN 60068-2-27 147.15 m/s ² (15 g)/11 ms; 3 shocks in each axis and direction
Ambient conditions	
Protection class	Class III (PELV) to EN 61800-5-1
Shock protection	Class I (with PE conductor system) acc. to EN 61800-5-1
Permissible ambient and coolant temperature (air) during operation for Power Modules	-10 to +40 °C without derating, > 40 to 55 °C, see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units	-10 ... +55 °C with CU240D DP-F and/or CU240D PN-F: 0 ... 40 °C up to 2000 m above sea level

¹⁾ In transport packaging.

²⁾ For further, general information, see also SINAMICS G110 sections "Technical specifications" and "Compliance with standards".

³⁾ With shielded motor cable up to 15 m.

Product type description	SINAMICS G120D
Climatic ambient conditions	
• Storage ¹⁾	EN 60068-2-1 Temperature -40 ... +70 °C
• Transport ¹⁾	EN 60068-2-1 Temperature -40 ... +70 °C max. air humidity 95 % at 40 °C
• Operation	EN 60068-2-2 Temperature -10 ... +40 °C without derating
Environmental class/harmful chemical substances	
• Operation	Class 3C2 to EN 60721-3-3
Degree of contamination	2 to EN 61800-5-1
Standards	
Standards conformance	UL, cUL, CE, c-tick
CE mark	To Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EEC
EMC directive ²⁾	
• Frame sizes FSA to FSC with integrated line filter class A	Category C2 ³⁾ to EN 61800-3 (corresponds to class A to EN 55011)

Note:

The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter. The frequency inverters on their own do not generally require identification according to the EMC directive

More information

Further information on technical specifications and ordering data can be found in Catalog D11.1 "SINAMICS G110/G120 Built-in Devices and SINAMICS 120D Distributed Frequency Converter" as well as in the interactive catalog under "Drives Technology/AC Converters/Low-Voltage Converters" for "SINAMICS G110/G120 Built-in Devices and SINAMICS 120D Distributed Frequency Converter".

PROFINET/Industrial Ethernet

SINAMICS G120D Distributed Frequency Inverters

CU240D PN and CU240D PN-F
Control Units

Overview



Example of CU240D PN-F Control Unit

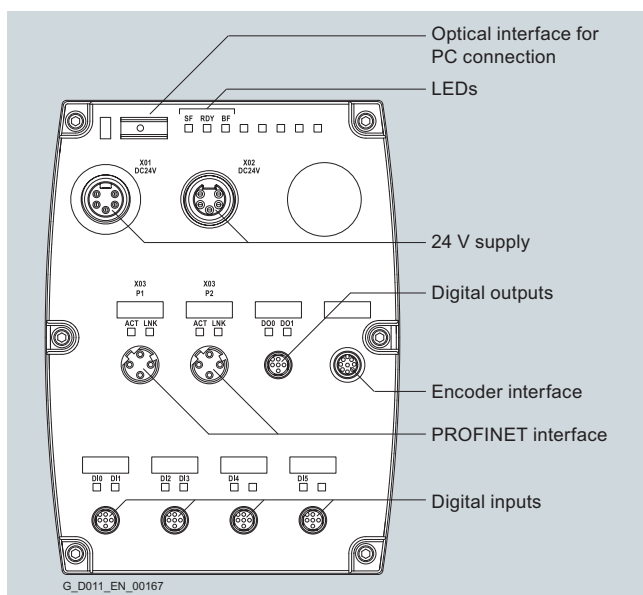
The Control Unit performs closed-loop control functions for the inverter. In addition to control functions, the Control Unit can also perform other tasks which can be adapted to the relevant application by parameterization. Control Units are available in different versions:

- CU240D PN
- CU240D PN-F

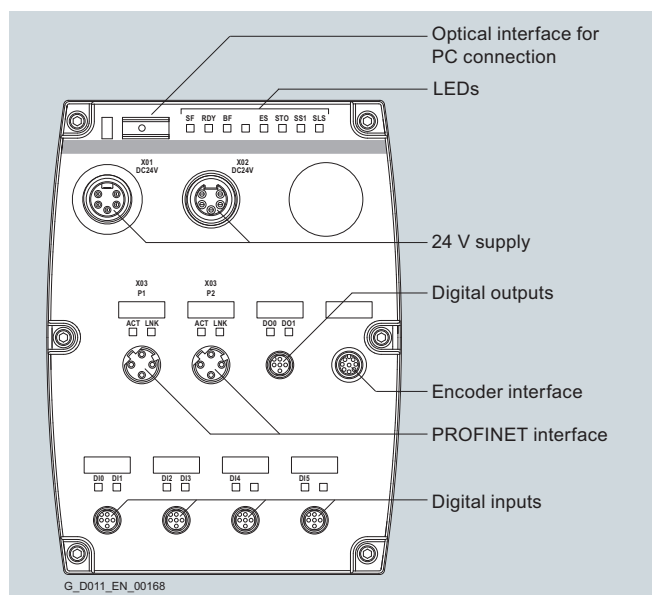
Selection and ordering data

Communication	Digital inputs	Digital outputs	Encoder interfaces	Designation	Control Unit Order No.
Standard					
PROFINET	6	2	1	CU240D PN	6SL3544-0FA20-1FA0
Fail-safe for Safety Integrated					
PROFINET	6	2	1	CU240D PN-F	6SL3544-0FA21-1FA0

Design



CU240D PN Control Unit



CU240D PN-F Control Unit

Safety Integrated functions

The SINAMICS G120D fail-safe frequency inverter provides three safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- Safe torque off (STO) to protect against active movement of the drive
- Safe Stop 1 (SS1) for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS) for protection against dangerous movements on exceeding a speed limit

The functions "Safe Stop 1" and "Safely limited speed" can both be implemented without a motor sensor or encoder; the implementation cost is minimal. Existing plants in particular can be updated with safety technology without the need to change the motor or mechanical system.

The safety functions "Safely limited speed" and "Safe stop 1" are certified for asynchronous motors without encoders - these safety functions are not permitted for pull-through loads as in the case of lifting gear and winders.

Note:

For further information, please refer to section Safety Integrated in Catalog D11.1s.

PROFINET/Industrial Ethernet

SINAMICS G120D Distributed Frequency Inverters

CU240D PN and CU240D PN-F Control Units

Design (continued)



Control Unit, view of rear panel, MMC slot on top and PM-IF interface in center at bottom

Technical specifications

Product type description	CU240D PN Control Unit 6SL3544-0FA20-1FA0	CU240D PN-F Control Unit 6SL3544-0FA21-1FA0
Electrical data		
Operating voltage	External 24 V DC required	External 24 V DC required
Power consumption ¹⁾ (from the 24 V supply)		
• with Power Module frame sizes FSA and FSB	350 mA	350 mA
• with Power Module frame size FSC	500 mA	500 mA
Interfaces		
Digital inputs	6	6
Digital outputs (0.5 A, supplied over switched 24 V DC)	2	2
Bus interface	PROFINET	PROFINET, PROFIsafe
Encoder interfaces	1	1
PTC/KTY interface (connected via Power Module)	✓	✓
Activation of a mechanical motor brake (connected via Power Module)	✓	✓
MMC memory card slot	✓	✓
RS232 interface (connected with RS232 interface cable via the optical interface of the Control Unit)	✓	✓
Safety functions		
Integral safety functions to Category 3 of EN 954-1 and SIL2 of IEC 61508		<ul style="list-style-type: none"> • Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • The safety functions "Safely limited speed" and "Safe stop 1" are certified for asynchronous motors without encoders - these safety functions are not permitted for pull-through loads as in the case of lifting gear and winders.

¹⁾ To this must be added the power consumption of connected encoders and sensors and the power draw on the digital outputs.

PROFINET/Industrial Ethernet

SINAMICS G120D Distributed Frequency Inverters

CU240D PN and CU240D PN-F
Control Units

Technical specifications (continued)

Product type description	Control Unit CU240D PN 6SL3544-0FA20-1FA0	Control Unit CU240D PN-F 6SL3544-0FA21-1FA0
Open-loop and closed-loop control functions		
V/f linear/quadratic/parameterizable	✓	✓
V/f with flux current control (FCC)	✓	✓
Vector control, encoderless	✓	✓
Vector control with encoder	✓	✓
Torque control encoderless	✓	✓
Torque control with encoder	✓	✓
Software functions		
Fixed frequencies	16, programmable	16, programmable
Signal interconnection with BICO technology	✓	✓
Automatic restart following line failure or fault	✓	✓
Positioning deceleration ramp	✓	✓
Slip compensation	✓	✓
Free function blocks (FFB) for logic and arithmetic operations	✓	✓
Ramp smoothing	✓	✓
3 selectable drive data sets	✓	✓
3 selectable command data sets (CDS) (manual/auto)	✓	✓
Flying restart	✓	✓
JOG	✓	✓
Technology controller (PID)	✓	✓
Thermal motor protection	✓	✓
Thermal inverter protection	✓	✓
Setpoint specification	✓	✓
Motor identification	✓	✓
Motor holding brake	✓	✓
Mechanical specifications and environmental operating conditions		
Degree of protection	IP65	IP65
Operating temperature	-10 ... +55 °C (14 ... 131 °F)	0 ... 40 °C (32 ... 104 °F)
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	< 95 % RH, non-condensing	< 95 % RH, non-condensing
Dimensions		
• Width	150 mm	150 mm
• Height	210 mm	210 mm
• Depth	40 mm	40 mm
Weight, approx.	0.7 kg	0.7 kg

PROFINET/Industrial Ethernet

SINAMICS G120D Distributed Frequency Inverters

CU240D PN and CU240D PN-F
Control Units

Accessories

MMC memory card



The parameter settings for an inverter can be stored on the MMC memory card. When the plant is serviced, it is immediately ready for use again after, for example, replacement of the frequency inverter and transfer of the memory card data. The associated slot is located on the rear of the Control Unit.

	Order No.
MMC memory card	6SL3254-0AM00-0AA0

RS232 interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC over a point-to-point link if the appropriate software (STARTER commissioning tool¹⁾, Version 4.1, SP1 and higher) has been installed.

	Order No.
RS232 interface cable for communication with a PC	3RK1922-2BP00

STARTER commissioning tool

The STARTER commissioning tool (STARTER Version 4.1, SP1 and higher) supports the commissioning and maintenance of SINAMICS G120D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

	Order No.
STARTER commissioning tool ¹⁾ on DVD	6SL3072-0AA00-0AG0

¹⁾ STARTER commissioning tool also available on the Internet at <http://support.automation.siemens.com/WW/view/de/10804985/133100>

Spare parts kit

A spare parts kit can be ordered which comprises small parts such as replacement seals, cover caps, PROFIBUS address windows and screws.

	Order No.
Spare parts kit for SINAMICS G120D Control Units comprising replacement seals, cover caps, PROFIBUS address windows and screws	6SL3500-0SK01-0AA0

PROFINET connecting cable

Flexible connecting cables and plug-in connectors that can be assembled in the field for transmission of data (up to 100 Mbit/s) between Industrial Ethernet stations with IP65 degree of protection.

	Order No.
IE connecting cable M12-180/M12-180 Pre-assembled IE FC TP trailing cable GP 2 x 2 PROFINET type C) with two 4-pole M12 plugs (4-pole, D-coded), IP65/IP67 degree of protection Length: <ul style="list-style-type: none"> • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m 	6XV1870-8AE30 6XV1870-8AE50 6XV1870-8AH10 6XV1870-8AH15 6XV1870-8AH20 6XV1870-8AH30 6XV1870-8AH50 6XV1870-8AN10 6XV1870-8AN15
IE M12 plug PRO For assembly in the field, M12 plug-in connector (D-coded), metal enclosure, fast connection method, for SCALANCE X208PRO and IM 154-4 PN <ul style="list-style-type: none"> • 1 unit • 8 units 	6GK1901-0DB10-6AA0 6GK1901-0DB10-6AA8

Connecting cable/plug-in connector for supplying the Control Unit with power

	Order No.
7/8" plug-in cable For power supply, pre-assembled with two 5-pole 7/8" male/female connectors Length: <ul style="list-style-type: none"> • 0.3 m • 0.5 m • 1.0 m • 1.5 m • 2.0 m • 3.0 m • 5.0 m • 10 m • 15 m 	6XV1822-5BE30 6XV1822-5BE50 6XV1822-5BH10 6XV1822-5BH15 6XV1822-5BH20 6XV1822-5BH30 6XV1822-5BH50 6XV1822-5BN10 6XV1822-5BN15
7/8" plug-in connector 5-pole, B-coded, plastic enclosure, 1 pack = 5 units <ul style="list-style-type: none"> • Male insert • Socket insert 	6GK1905-0FA00 6GK1905-0FB00

Further selected accessories are available from Siemens Solution Partners.

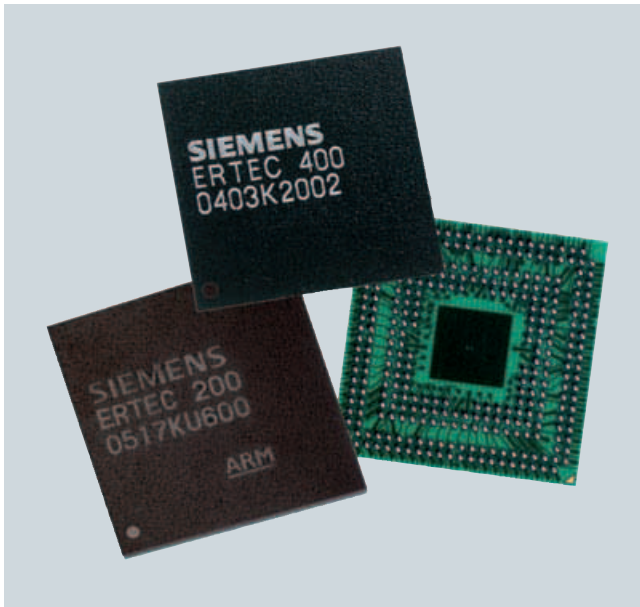
Additional information can be found in the Internet under: <http://www.siemens.com/automation/partnerfinder> and select technology "Distributed Field Installation System".

PROFINET/Industrial Ethernet

PROFINET Technology components

ERTEC enhanced real-time Ethernet controller

Overview



PROFINET IO uses Fast Switched Ethernet as the communications basis with a transfer rate of 100 Mbit/s. The required functions are supported by hardware ASICs of the ERTEC range (Enhanced Real-Time Ethernet Controller), and high performance values are achieved. Previously required discrete components have been included in the ERTECs as a system-on-chip. These high-performance Ethernet controllers with integral real-time switch and 32-bit microprocessor have been specially designed for industrial applications. It is then possible to implement powerful PROFINET connections in the smallest possible space.

The ERTEC 200 is available for simple field devices, and the ERTEC 400 for controllers and network components. They feature a rugged design, specific automation functions, and openness to the IT world.

- Easy space-saving connection of devices to switched 10/100 Mbit Ethernet
- No need for external network components since the switches are integrated into the device
- Integral high-performance ARM 946 processor for optimum integration of communications and applications
- Specific communication functions for automation technology secure the position of the technology as front runner for time-critical applications through real-time characteristics
- The DK-ERTEC 200 PN IO and DK-ERTEC 400 PN IO development kits with global technical support enable simple implementation

Technical specifications

Product type description	ERTEC 400	ERTEC 200
Transfer rate	10/100 Mbit/s	10/100 Mbit/s
Interfaces		
• Ethernet / PHY interface	4 x PHY interface <ul style="list-style-type: none"> • Half/full duplex • Broadcast filter • IEEE 802.1 p Traffic Management • IEEE 802.1 q VLAN Tagging and Identification • IEEE 1588 	2 x Ethernet interface (PHY integrated) or alternatively 2 x PHY interface (for connecting optical PHYs) <ul style="list-style-type: none"> • Half/full duplex • Broadcast filter • IEEE 802.1 p Traffic Management • IEEE 802.1 q VLAN Tagging and Identification • IEEE 1588
- in association with the corresponding PHY types:	Supports copper and fiber-optic conductors; Autosensing; Autocrossover	Supports copper and fiber-optic conductors (PHY for Cu integrated); Autosensing; Autocrossover
• Local bus unit (LBU)	Local bus master interface for an external host with access to internal areas of the ERTEC; 16-bit data bit width	Local bus master interface for an external host with access to internal areas of the ERTEC; 16-bit data bit width
• PCI interface	32 bit, 33/66 MHz <ul style="list-style-type: none"> • Host functionality • Memory protection unit (MPU) • 2 PCI interrupt outputs INTA_N and SERR_N • Power Management V1.1 • 3.3 Volt (5 V tolerant) • PCI master/target interface • PCI core conformant to PCI spec. 2.2 	—
• External memory interface (EMIF)		
- SDRAM controller	128 MB/16 bit or 256 MB/32 bit	64 MB/16 bit or 128 MB/32 bit
- SRAM controller	4 x 16 MB for asynchronous blocks (SRAM, Flash, I/O 8/16/32 bit)	4 x 16 MB for asynchronous blocks (SRAM, Flash, I/O 8/16/32 bit)
- chip select support	Yes	Yes
• IO interfaces	32 parameterizable I/O (GPIO); multifunction outputs	45 parameterizable I/O (GPIO); multifunction outputs

PROFINET/Industrial Ethernet

PROFINET Technology components

ERTEC enhanced real-time Ethernet controller

Technical specifications (continued)

Product type description	ERTEC 400	ERTEC 200
Components		
<ul style="list-style-type: none"> Real-time Ethernet switch <ul style="list-style-type: none"> communications RAM (SRAM on chip for message buffering) intelligent switching and PROFINET IRT prioritizing/timing Integral ARM946 processor <ul style="list-style-type: none"> adjustable operating frequency data cache instruction cache D-TCM memory protection unit (MPU) trace functionality interrupt controller Processor I/O <ul style="list-style-type: none"> SPI master interface timer 32-bit counting downwards F-Timer 32-bit counting downwards watchdog functions external interrupt inputs Internal bus structure SRAM-integrated main memory on AHB <ul style="list-style-type: none"> size program/data memory multiport RAM Clock generation Boot ROM Debugging functions 	<ul style="list-style-type: none"> Integral 4-port Fast Ethernet/real-time Ethernet switch; 10/100 Mbit Ethernet full-duplex 192 KB Yes 32-bit ARM system 50/100/150 MHz 4 KB 8 KB 4 KB Yes Debugging capability through embedded ICE (JTAG) For 16xIRQ/ 8xFIQ 2 UART similar to the UART 16C550 standard Yes 2 Yes 2 Yes 32 bit (multi-layer AHB) with 50 MHz clock frequency; multi-layer architecture with parallel access structure of several multimasters to multislave 8 KB ARM 946 For ARM946, IRT and PCI Internal through PLL for ARM 946ES, AHB, APB and IRT With Opcode for software download from various sources Boundary scan 	<ul style="list-style-type: none"> Integral 2-port Fast Ethernet/real-time Ethernet switch; 10/100 Mbit Ethernet full-duplex 64 KB Yes 32-bit ARM system 50/100/150 MHz 4 KB 8 KB 4 KB j Debugging capability through embedded ICE (JTAG) For 16xIRQ/ 8xFIQ 1 UART similar to the UART 16C550 standard Yes 3 Yes 3 Yes 32 bit (multi-layer AHB) with 50 MHz clock frequency; multi-layer architecture with parallel access structure of several multimasters to multislave – – – Internal through PLL for ARM 946ES, AHB, APB and IRT With Opcode for software download from various sources Boundary scan
Supply voltage		
<ul style="list-style-type: none"> Core (VDD core) I/Os (VDD IO) 	<ul style="list-style-type: none"> 1.5 V +/- 10 % 3.3 V +/- 10 % 	<ul style="list-style-type: none"> 1.5 V +/- 10 % 3.3 V +/- 10 %
Current consumption		
<ul style="list-style-type: none"> IDD core IDD IO 	<ul style="list-style-type: none"> typ. 270 mA typ. 150 mA 	<ul style="list-style-type: none"> typ. 535 mA typ. 175 mA
Power loss		
<ul style="list-style-type: none"> PDD core PDD IO 	<ul style="list-style-type: none"> typ. 0.4 W typ. 0.5 W 	<ul style="list-style-type: none"> typ. 0.8 W typ. 0.57 W
Permissible ambient conditions		
<ul style="list-style-type: none"> Operating temperature Transport/storage temperature Relative humidity 	<ul style="list-style-type: none"> -40 °C ... +85 °C -40 °C ... +85 °C max. 95 % at +25 °C 	<ul style="list-style-type: none"> -40 °C ... +85 °C -40 °C ... +85 °C max. 95 % at +25 °C

PROFINET/Industrial Ethernet

PROFINET Technology components

ERTEC enhanced real-time Ethernet controller

Technical specifications (continued)

Product type description	ERTEC 400	ERTEC 200
Design		
• Enclosure	Plastic FBGA 304 pin	Plastic FBGA 304 pin
• Pinning ball pitch	0.8 mm	0.8 mm
• Soldering notes	Versions available for leaded and unleaded processing	Versions available for leaded and unleaded processing
Dimensions (W x H x D) in mm	19 x 1 x 19	19 x 1 x 19
- ERTEC		
Supported communications protocols		
• General Ethernet protocols	Corresponding to the respective software implementation which uses the ERTEC as Ethernet controller	Corresponding to the respective software implementation which uses the ERTEC as Ethernet controller
• PROFINET in combination with a PROFINET software stack	Real-time communication (RT); isochronous real-time communication (IRT)	Real-time communication (RT); isochronous real-time communication (IRT)

Note:

If you have any technical questions, please contact the PROFI Competence Centers

Germany and Europe

Siemens AG
ComDeC
Postfach 2355
D-90713 Fürth
Germany
Tel.: +49/911/750 - 2080
Fax: +49/911/750 - 2100
Email: comdec@siemens.com

America

PROFI Interface Center
One Internet Plaza
Johnson City, TN, 37604
U.S.A.
Tel.: (423) - 262 - 2576
Fax: (423) - 262 - 2103
Email: profibus.sea@siemens.com

Ordering data

ERTEC 400

ASIC ERTEC 400 for connection to switched Ethernet 10/100 Mbit/s, Ethernet controller with integrated 4-port switch, ARM 946 RISC and PCI interface (V2.2), data preparation for real-time and isochrone real-time for PROFINET IO

- Unleaded
 - 70 units (individual tray),
 - 350 units (drypack, 5 trays),

Development Kit DK-ERTEC 400 PN IO

Development Pack V2.0 for ASIC ERTEC 400 for real-time and isochrone real-time, consisting of:
CP 1616,
ERTEC 400 Evaluation Board,
ASICs ERTEC 400 (10 units),
IE FC RJ45 Plug 180 (2 units),
IE FC Standard Cable 2 x 2 (5 m),
IE FC Stripping Tool,
DK-16xx PN IO V 2.0,
Wind River Evaluation Software,
Documentation and Sample Software

Order No.

6GK1 184-0BB00-0AA1
6GK1 184-0BB00-0AA2

6GK1 953-0CA00

ERTEC 200

ASIC ERTEC 200 for connection to switched Ethernet 10/100 Mbit/s, Ethernet controller with integrated 2-port switch, ARM 946 processor and integrated PHYs real-time for PROFINET IO

- Unleaded
 - 70 units (individual tray),
 - 350 units (drypack, 5 trays),

Development Kit DK-ERTEC 200 PN IO

Development Pack V2.0 for ASIC ERTEC 200 for real-time and isochrone real-time, consisting of:
CP 1616,
ERTEC 200 Evaluation Board,
ASICs ERTEC 200 (10 units),
IE FC RJ45 Plug 180 (2 units),
IE FC Standard Cable 2 x 2 (5 m),
IE FC Stripping Tool,
DK-16xx PN IO V 2.0,
Wind River Evaluation Software,
Documentation and Sample Software

Order No.

6GK1 182-0BB00-0AA1
6GK1 182-0BB00-0AA2

6GK1 953-0BA00

PROFINET/Industrial Ethernet

PROFINET Technology components

Development Kits for ERTEC

Overview



- The DK-ERTEC 200 PN IO and DK-ERTEC 400 PN IO Development Kits are available for development of PROFINET and Industrial Ethernet devices with integral real-time switch
- Possible applications:
 - development of IO field devices (as PROFINET IO-Device) with a PROFINET interface
 - development of drives with PROFINET
 - development of any other device with an Industrial Ethernet interface

Technical specifications

If you have any technical questions, please contact the PROFI Competence Centers:

Germany and Europe

Siemens AG
ComDeC
Postfach 2355
D-90713 Fürth
Germany
Tel.: +49/911/750 - 2080
Fax: +49/911/750 - 2100
Email: comdec@siemens.com

America

PROFI Interface Center
One Internet Plaza
Johnson City, TN, 37604
U.S.A.
Tel.: (423) - 262 - 2576
Fax: (423) - 262 - 2103
Email: profibus.sea@siemens.com

Ordering data

Order No.

Development Kit DK-ERTEC 200 PN IO

6GK1 953-0BA00

Development kit V2.0 for ASIC ERTEC 200 for real-time and isochronous real-time, consisting of:
CP 1616,
ERTEC 200 evaluation board,
ASICs ERTEC 200 (10 units),
IE FC RJ45 plug 180 (2 units),
IE FC standard cable 2 x 2 (5 m),
IE FC stripping tool,
DK-16xx PN IO V 2.0,
Wind River evaluation software,
Documentation and sample software

Development Kit DK-ERTEC 400 PN IO

6GK1 953-0CA00

Development kit V2.0 for ASIC ERTEC 400 for real-time and isochronous real-time, consisting of:
CP 1616,
ERTEC 400 evaluation board,
ASICs ERTEC 400 (10 units),
IE FC RJ45 plug 180 (2 units),
IE FC standard cable 2 x 2 (5 m),
IE FC stripping tool,
DK-16xx PN IO V 2.0,
Wind River evaluation software,
Documentation and sample software

PROFINET IO production license for one product line

6ES7 195-3BC10-0YA0

Production license for one product family based on ERTEC 200 or ERTEC 400

Development package for PROFINET IO

6ES7 195-3BC00-0YA0

for Ethernet processors

PROFINET IO controller

Communication Processor CP 1616

6GK1 161-6AA00

PCI card (32 bit; 3.3/5 V) with ASIC ERTEC 400 for connection to PROFINET IO with 4-port real-time switch (RJ45), use via development kit DK-16xx PN IO; NCM PC

SOFTNET PN IO Edition 2007

6GK1 704-1HW70-3AA0

Software for PROFINET IO controller with OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on USB flash drive, Class A, for 32 Bit Windows XP Professional, Windows Server 2003, Server 2003 R2; Windows Ultimate/Business; German/English

CPU 317-2 PN/DP

6ES7 317-2EJ10-0AB0

512 KB RAM, 24 V DC supply voltage, combined MPI/PROFIBUS DP master/slave interface, Ethernet/PROFINET interface, MMC required

PROFINET/Industrial Ethernet

PROFINET Technology components

Development Kits for ERTEC

2

Ordering data	Order No.	Order No.
Network components		ASIC enhanced real-time Ethernet controller
IE FC RJ45 Plug 180 RJ45 connector for Industrial Ethernet with rugged metal enclosure and integral IDC contacts for connecting the Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPU's with Industrial Ethernet interface		ERTEC 200 ASIC ERTEC 200 for connection to switched Ethernet 10/100 Mbit/s, Ethernet controller with integrated 2-port switch, ARM 946 processor and integrated PHYs real-time for PROFINET IO
<ul style="list-style-type: none"> • 1 pack = 1 units • 1 pack = 10 units • 1 pack = 50 units 	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0	<ul style="list-style-type: none"> • Unleaded - 70 units (individual trays), - 350 units (drypack, 5 trays),
		6GK1 182-0BB00-0AA1 6GK1 182-0BB00-0AA2
IE FC standard cable 2 x 2 (Type B) 4-wire, screened TP installation cable for connection to IE FC outlet RJ45/IE FC RJ45 plug; PROFINET-compliant; with UL-approval; sold by the meter; delivery unit max. 1000 m, minimum order length 20 m	6XV1 840-2AH10	ERTEC 400 ASIC ERTEC 400 for connection to switched Ethernet 10/100 Mbit/s, Ethernet controller with integrated 4-port switch, ARM 946 RISC and PCI (V2.2), data preparation for real-time and isochronous real-time for PROFINET IO
IE FC stripping tool Pre-adjusted stripping tool for fast stripping of insulation from Industrial Ethernet FC cables	6GK1 901-1GA00	<ul style="list-style-type: none"> • Unleaded - 70 units (individual trays), - 350 units (drypack, 5 trays),
		6GK1 184-0BB00-0AA1 6GK1 184-0BB00-0AA2
Industrial Ethernet switches SCALANCE X-200IRT Managed Industrial Ethernet switches; real-time (RT) and isochronous real-time (IRT), LED diagnostics, fault signal contact with SET button, redundant voltage supply		
<ul style="list-style-type: none"> • SCALANCE X-204IRT; 4 x 10/100 Mbit/s RJ45 ports • SCALANCE X-204IRT PRO; 4 x 10/100 Mbit/s RJ45 push-pull ports • SCALANCE X-202-2IRT; 2 x 10/100 Mbit/s RJ45 ports; 2 x 100 Mbit/s multimode BFOC • SCALANCE X-202-2P IRT; 2 x 10/100 Mbit/s RJ45 ports; 2 x 100 Mbit/s POF/PCF SC RJ • SCALANCE X-202-2P IRT PRO; 2 x 10/100 Mbit/s RJ45 push-pull ports; 2 x 100 Mbit/s POF/PCF SC RJ push-pull ports • SCALANCE X-201-3P IRT; 1 x 10/100 Mbit/s RJ45 ports; 3 x 100 Mbit/s POF/PCF SC RJ • SCALANCE X-200-4P IRT; 4 x 100 Mbit/s POF/PCF SC RJ 	6GK5 204-0BA00-2BA3 6GK5 204-0JA00-2BA6 6GK5 202-2BB00-2BA3 6GK5 202-2BH00-2BA3 6GK5 202-2JR00-2BA6 6GK5 201-3BH00-2BA3 6GK5 200-4AH00-2BA3	

More information

You can find more detailed information, technical data and manuals for the ERTEC 200, ERTEC 400, DK-ERTEC 200 PN IO and DK-ERTEC 400 PN IO in the Internet.

<http://www.siemens.com/ertec-microsite>

Additional information can be found in the Internet under:

<http://www.siemens.com/simatic-net/ik-info>

<http://www.siemens.com/ertec>

<http://support.automation.siemens.com/WW/view/de/18977720/133300>

The Wind River development environment can be purchased from:

Wind River GmbH
 Osterfeldstrasse 84
 85737 Ismaning, Germany
 Tel.: +49 89 96 24 45 0
 Fax: +49 89 96 24 45 999
inquiries-de@windriver.com

Additional information can be found in the Internet under:

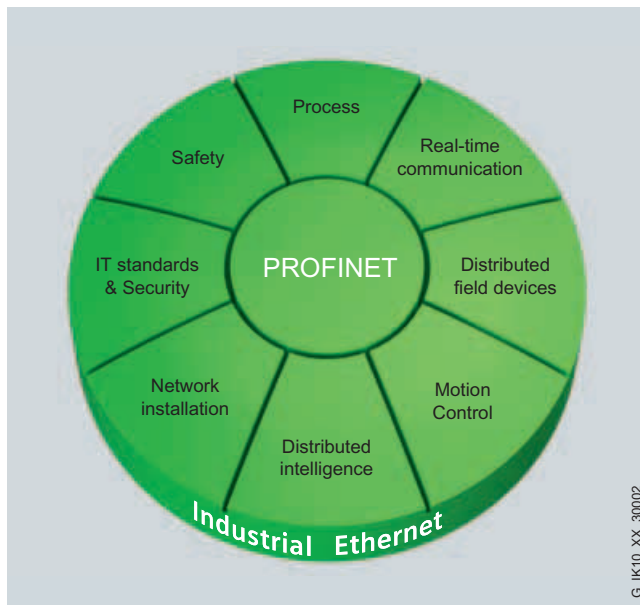
<http://www.windriver.com/alliances/eval-cd/details.html?pgmid=ERTEC>

PROFINET/Industrial Ethernet

PROFINET Technology components

Development packages

Overview



In time for market entry of PROFINET IO, a development package is available that allows third-party manufacturers to develop and offer their own PROFINET IO devices.

Technical specifications

Please address any technical questions about the development kit to:

In Germany and Europe

Siemens AG
ComDeC
P.O. Box 2355
90713 Fürth
Germany
Tel.: +49/911/750 - 2080
Fax: +49/911/750 - 2100
E-mail: comdec@fthw.siemens.de

U.S.A.

PROFI Interface Center
One Internet Plaza
Johnson City, TN, 37604
U.S.A.
Tel.: (423) - 262 - 2576
Fax: (423) - 262 - 2103
E-mail: profibus.sea@siemens.com

Ordering data

Order No.

Development package for PROFINET IO

For Ethernet processor

6ES7 195-3BC00-0YA0

Accessories

CPU 317-2 PN/DP

Main memory 1 MB, power supply 24 V DC, combined MPI/PROFIBUS DP master/slave interface, Ethernet/PROFINET interface; MMC required

6ES7 317-2EK13-0AB0

Micro Memory Card

e.g. 512 KB (other MMC optional)

6ES7 953-8LJ20-0AA0

Programming device software STEP 7, V5.4

Floating License, STL, LAD-, FBD programming for S7-300/400/C7 and WinAC

6ES7 810-4CC08-0YA5

SCALANCE X 108 switch

(other switch optional)

6GK5 108-0BA00-2AA3

SIMATIC NET TP cable

RJ45/RJ45, length 2 m
At least 3 units are required; other cable types/lengths optional

6XV1 850-2GH20

Power supply PS 307

120 V AC, 24 V DC, 2 A (optional)

6ES7 307-1BA00-0AA0

More information

The development environment can be obtained from NetSilicon:

In Germany and Europe

Digi GmbH (NetSilicon)
Joseph-von-Fraunhofer-Str. 23
44227 Dortmund
Germany
Tel: +49 231 9747 550
Fax: +49 231 9747 650
E-mail: emea-sales@netsilicon.com

Additional information can be found in the Internet under:

<http://www.netsilicon.com/>

USA

NetSilicon, Inc.
411 Waverley Oaks Road #304
Waltham, MA 02452
U.S.A.
Tel: ++1 800 243-2333, 781 647-1234
Fax: ++1 781 893-1338
E-mail: info@netsilicon.com

Additional information can be found in the Internet under:

<http://www.netsilicon.com/>

Asia

NetSilicon Japan, Inc.
NES Bldg. South 8F 22-14 Sakuragaoka-cho
Shibuya-ku, Tokyo, 150-0031
Japan
Tel: +81-3-5428-0261
Fax: +81-3-5428-0262
E-mail: japan-sales@netsilicon.com

Additional information can be found in the Internet under:

<http://www.netsilicon.co.jp/>

PROFINET/Industrial Ethernet

Operator control and monitoring devices

SIMATIC Mobile Panels

Overview



- Mobile operator panel for direct operator control of the plant and machine from any point
- Supports optimized monitoring of the workpiece or process providing at the same time direct access and direct line of sight to the operator panel
- Flexible application with simple reconnection during operation (Mobile Panel 177 and Mobile Panel 277) or
- wireless freedom (Mobile Panel 277(F) IWLAN)
- Pixel-graphics, brilliant color display with touch screen (analog/resistive)
- PROFIBUS or PROFINET communication, PROFINET through WLAN with Mobile Panel 277(F) IWLAN
- Freely configurable and inscribable function keys (with LED)

SIMATIC Mobile Panel 177 and SIMATIC Mobile Panel 277

- Two three-stage acknowledgement buttons; optional versions include:
 - STOP button
 - STOP button, handwheel, key-operated switch and illuminated pushbutton
- Communication is supported via a serial, MPI/PROFIBUS or PROFINET interface
- Connection point detection for local identification of the device based on the connection point ID
- Fast system availability after plugging into the connectivity boxes
- Connected to the controller and power supply via the connectivity box and the connecting cable

SIMATIC Mobile Panel 277(F) IWLAN

- Wireless, mobile operator panel for flexible and location-independent system and machine operation
- WLAN communication in accordance with IEEE 802.11 a (b/g) and support of PROFINET
- Powerful batteries and flexible concept for changing permit battery replacement "on the fly" without interrupting operation
- Effective range limitation and the local identification of the device by using transponder technology
- Optional variants with: handwheel, key-operated switch and illuminated pushbutton
- Fail-safe operator controls of the SIMATIC Mobile Panel 277F IWLAN using PROFIsafe:
 - Two three-stage acknowledgement buttons
 - Emergency stop button

PROFINET/Industrial Ethernet

Operator control and monitoring devices

SIMATIC Mobile Panels

2

Order data	Order No.	Order No.
SIMATIC Mobile Panel 177 PN (PROFINET) <ul style="list-style-type: none"> With integrated acknowledgement button With integrated acknowledgement button and STOP button With integrated acknowledgement button, STOP button, handwheel, key-operated switch and illuminated pushbutton 	6AV6 645-0BA01-0AX0 6AV6 645-0BB01-0AX0 6AV6 645-0BC01-0AX0	Accessories for Mobile Panel 277 IWLAN/277F IWLAN
SIMATIC Mobile Panel 277 8" ¹⁾ <ul style="list-style-type: none"> With integrated acknowledgement button With integrated acknowledgement button and STOP button With integrated acknowledgement button, STOP button, handwheel, key-operated switch and illuminated pushbutton 	6AV6 645-0CA01-0AX0 6AV6 645-0CB01-0AX0 6AV6 645-0CC01-0AX0	Tabletop power supply unit incl. power cable for EU, US, UK, JP (only suitable for operation under laboratory/office conditions)
SIMATIC Mobile Panel 277 10" <ul style="list-style-type: none"> With integrated acknowledgement button and STOP button 	6AV6 645-0BE02-0AX0	Charging station for safe storage and charging the device incl. lock for securing the device in the charging station. Charging capabilities for up to two extra batteries
SIMATIC Mobile Panel 277 IWLAN <ul style="list-style-type: none"> Communication via WLAN (PROFINET) Communication via WLAN (PROFINET) with integrated handwheel, key-operated switch and two illuminated pushbuttons 	6AV6 645-0DD01-0AX0 6AV6 645-0DE01-0AX0	Extra battery with LED indicator for indicating the charge status
SIMATIC Mobile Panel 277F IWLAN <ul style="list-style-type: none"> Communication via WLAN (PROFINET) with acknowledgement button and emergency stop button Communication via WLAN (PROFINET) with acknowledgment button and emergency stop button with integrated handwheel, key-operated switch, and two illuminated pushbuttons 	6AV6 645-0DB01-0AX0 6AV6 645-0DC01-0AX0	Transponder incl. batteries (3x AA)
Starter packages <ul style="list-style-type: none"> Mobile Panel 177 PN Plus Mobile Panel 277 PN 8" Mobile Panel 277 DP 8" Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN 	6AV6 651-5DA01-0AA0 6AV6 651-5FB01-0AA0 6AV6 651-5EB01-0AA0 6AV6 651-5GA01-0AA0 6AV6 651-5HA01-0AA0	Service pack for Mobile Panel 177/277
Accessories		Service pack for Mobile Panel 277(F) IWLAN contains accessories pack for Mobile Panel 277 (labeling strip cover), battery compartment cover (device), backup battery, cover left/right (charging station), power supply connector counterpart (charger), spare key (charging station)
Connection box PN for Mobile Panel (PROFINET) <ul style="list-style-type: none"> Basic Plus 	6AV6 671-5AE01-0AX0 6AV6 671-5AE11-0AX0	Optional package Accumulator for Mobile Panels (DP and PN)
PN connecting cable (PROFINET)		Wall holder for Mobile Panels
Standard cables <ul style="list-style-type: none"> 2 m 5 m 8 m 10 m 15 m 20 m 25 m 	6XV1 440-4BH20 6XV1 440-4BH50 6XV1 440-4BH80 6XV1 440-4BN10 6XV1 440-4BN15 6XV1 440-4BN20 6XV1 440-4BN25	Touch pen incl. nylon line for securing it to the Mobile Panel 277 10" <ul style="list-style-type: none"> 1 set = 5 units
		Spare key for Mobile Panels (pack of 10)
		Protective foil <ul style="list-style-type: none"> for Mobile Panel 177 1 pack = 10 units for Mobile Panel 277 8" 1 pack = 2 units for Mobile Panel 277 10" 1 pack = 10 units

¹⁾ The system components (connecting cables and connection boxes) must be ordered separately.

Note:

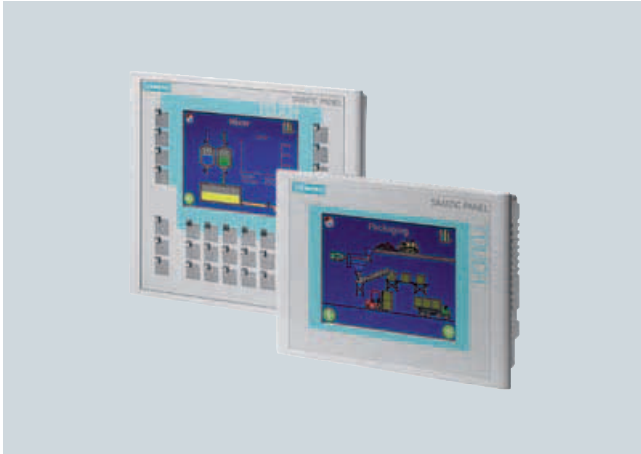
Documentation (to be ordered separately) and further accessories for Mobile Panels can be found in the ST 80 Catalog, in the electronic catalog CA 01 and in the A&D Mall at <http://www.siemens.com/automation/mall>

PROFINET/Industrial Ethernet

Operator control and monitoring devices

SIMATIC Panels

Overview



SIMATIC Panels

SIMATIC Panels are compact and rugged operator panels for use directly at the machine – finely graded in performance and user-friendliness.

Devices with PROFINET connection are used for solutions that utilize the Industrial Ethernet standard for automation.

SIMATIC TP 177B DP/ PN and OP 177B DP/PN

- Touch Panel (TP 177B) and Touch/Key Panel (OP 177B) with comprehensive range of functions for operator control and monitoring of machines and plants
- Pixel graphics 5.7" color STN display (256 colors) with touch screen (analog/resistive)
- OP 177 B DP/PN with additional 32 function keys
- Onboard MPI, USB, PROFIBUS and PROFINET interfaces
- Data in the message buffer is retained even when panel is disconnected from the power supply without batteries
- Function keys of the OP 177 B DP/PN can be assigned system functions and configured as direct keys
- Multi Media Card slot
- Can be configured using SIMATIC WinCC flexible 2005 Compact and higher

SIMATIC TP 277 6" and OP 277 6"

- Touch Panel (TP 277) and Operator Panel (OP 277) with comprehensive functionality for demanding machine visualization
- Pixel graphics 5.7" color TFT display (256 colors), TP 277 6" with touch screen (analog/resistive)
- OP 277 6" with 36 system keys, 24 freely configurable and freely inscribable function keys (18 with LEDs)
- Content of message buffer is retained even when panel is disconnected without batteries
- Onboard MPI, USB, PROFIBUS and PROFINET interfaces
- Use of scripts and archives
- Windows CE operating system
- Multi Media Card slot
- Can be configured using SIMATIC WinCC flexible 2005 SP1 Standard or higher

Order data

Order No.

SIMATIC TP 177B

Touch Panel with 5.7" STN display, color (256 colors), incl. mounting accessories

6AV6 642-0BA01-1AX1

TP 177B starter kit

Consisting of:

- TP 177B with STN display, blue mode
- SIMATIC WinCC flexible 2005 Compact configuration software
- SIMATIC HMI Manual Collection (CD), 5 languages (English, French, German, Italian, Spanish)
- MPI cable (5 m)
- Software Update Service for 1 year

6AV6 551-2EA01-1AA0

SIMATIC OP 177B

Operator Panel with 5.7" STN display, color (256 colors), incl. mounting accessories

6AV6 642-0DA01-1AX1

OP 177B starter kit

Consisting of:

- OP 177B with STN display, color
- SIMATIC WinCC flexible 2005 Compact configuration software
- SIMATIC HMI Manual Collection (CD), 5 languages (English, French, German, Italian, Spanish)
- MPI cable (5 m), PC/PPI cable
- Software Update Service for 1 year

6AV6 551-2HA01-1AA0

SIMATIC TP 277 6"

Touch Panel with 5.7" TFT display, color (256 colors)

6AV6 643-0AA01-1AX0

SIMATIC OP 277 6"

Operator Panel with 5.7" TFT display, color (256 colors)

6AV6 643-0BA01-1AX0

PROFINET/Industrial Ethernet

Operator control and monitoring devices

SIMATIC Multi Panels (MP)

Overview



Multi Panels (MP)

Multi Panels on the basis of Windows CE combine the ruggedness of operator panels with the flexibility of PCs. Due to their extremely high performance capability, they are suitable for demanding applications and their functionality can be expanded even more by installing additional Windows CE applications.

SIMATIC MP 277

- Multi Panel with comprehensive functionality for machine operation and monitoring on site
- Pixel-graphics 7.5" and 10.4" TFT displays with 64k colors
- Key or Touch versions available
- Onboard MPI, USB, PROFIBUS and PROFINET interfaces
- Content of message buffer is retained even when panel is disconnected without batteries
- SD/Multi Media Card slot
- Windows CE 5.0 operating system
- Can be configured using SIMATIC WinCC flexible 2005 SP1 Standard or Advanced
- Also available with stainless steel front (DIN EN 1672-2), thus meeting the high requirements of, for example, the food, beverages and tobacco industries.

SIMATIC MP 377

- Like Operator Panels, Multi Panels (MP) are used for local machine operation and monitoring
- Their functionality can be expanded by the installation of additional Windows CE applications (Multi Panel and Panel options)
- SIMATIC MP 377 devices on the basis of Windows CE combine the rugged construction of Operator Panels with the flexibility of PCs
- PLC functionality can be integrated directly into the MP 377 platform as an option
- Pixel-graphics 12.1", 15.1" or 19" TFT display, color (64k colors)
- MP 377 12" Touch, MP 377 15" Touch and MP 377 19" Touch: touch screen (analog/resistive)
- MP 377 12" Key:
38 system keys, 36 user-configurable and freely inscribable function keys (36 with LEDs)
- The MP 377 15" Touch is also available with a stainless steel front (DIN EN 1672-2). The stainless steel front is appropriate, for example, for the increased demands of the food and beverage industry
- All interfaces, e.g. MPI, PROFIBUS DP, USB, PROFINET (Ethernet TCP/IP), are on-board

Order data

Order No.

SIMATIC MP 277

- **8" TFT color display, Touch**
Touch screen, (analog/resistive)
- **8" TFT color display, Key**
38 system keys, 26 user-configurable and freely inscribable function keys (18 with LEDs)
- **10" TFT color display, Touch**
Touch screen (analog/resistive)
- **10" TFT color display, Touch, INOX**
Touch screen, (analog/resistive), with stainless steel front
- **10" TFT color display, Key**
38 system keys, 36 user-configurable and freely inscribable function keys (28 with LEDs)

6AV6 643-0CB01-1AX1

6AV6 643-0DB01-1AX1

6AV6 643-0CD01-1AX1

6AV6 643-8AD10-0AA1

6AV6 643-0DD01-1AX1

SIMATIC MP 377

- **12" color TFT display, Touch**
- **12" color TFT display, Key**
- **15" color TFT display, Touch**
- **19" color TFT display, Touch**

6AV6 644-0AA01-2AX0

6AV6 644-0BA01-2AX1

6AV6 644-0AB01-2AX0

6AV6 644-0AC01-2AX0

Overview



The SIMATIC RF180C is a communication module for direct connection of Siemens RFID systems to PROFINET IO. The readers (SLGs) of the RFID systems MOBY I, E, D, U and SIMATIC RF300 can be operated on the SIMATIC RF180C.

Due to the high degree of protection and its ruggedness, SIMATIC RF180C is ideally suited to use at machine level. The uniform plug-in connection system ensures rapid commissioning.

Benefits

- Two parallel MOBY channels ensure real-time operation of the dynamic read points
- Reader connection with an 8-pole M12 connector for rapid assembly of all components
- Easy changeover from PROFIBUS applications to PROFINET with SIMATIC RF180C thanks to software compatibility
- The integrated switch allows several PROFINET modules to be installed in star or bus topology. Each application can then be built up quickly and inexpensively
- Powerful hardware ensures rapid data communication with the reader (SLG). So that the data are available to the application more quickly
- Simple firmware downloading in the case of function expansions and error rectification ensures high availability of the RFID system
- Adjustable and parameterizable RFID-specific diagnostics facilitate commissioning and troubleshooting
- A broad selection of pre-assembled connecting cables can be ordered for connecting PROFINET and readers to SIMATIC RF180C. This saves time and money during installation and increases the quality
- The hardware configuration with a base unit and connection block ensures that SIMATIC RF180C is prepared for other connection techniques, such as fiber-optic cables

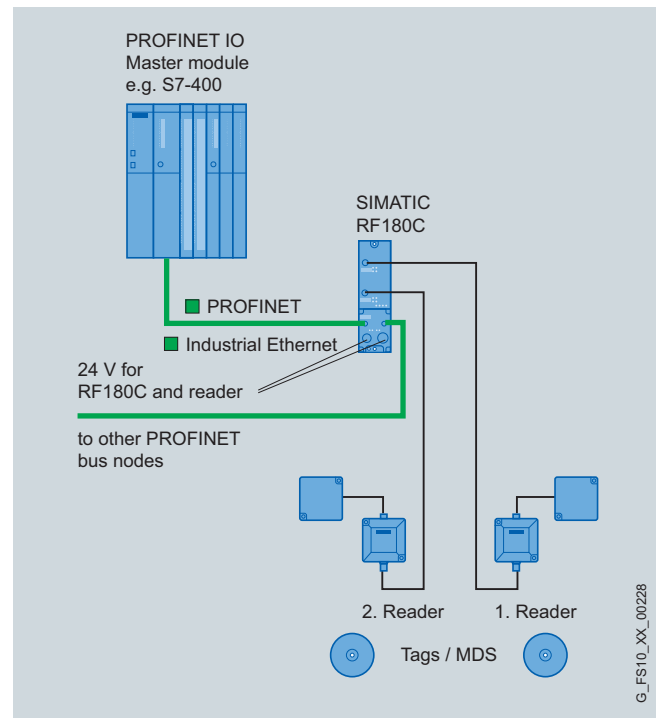
Application

The PROFINET communication module SIMATIC RF180C has been specially designed for a wide range of applications in industrial automation and logistics. Due to the high degree of protection IP67, SIMATIC RF180C can be installed in the process outside the control cabinet.

Main applications for SIMATIC RF180C:

- Machine manufacturing, automation systems, conveyor systems
- Ancillary assembly lines in the automotive industry / suppliers
- Small assembly lines

Design



PROFINET/Industrial Ethernet

RFID Systems

SIMATIC RF180C

Function

The SIMATIC RF180C comprises a basic module and a connection block that must be ordered separately.

The connection block is available in the version M12, 7/8". PROFINET is connected through an M12 plug, whereas the supply voltage is connected through a 7/8" plug. There are 2 connections for PROFINET as well as for the power supply. This ensures that SIMATIC RF180C can be connected to additional bus stations without the need for external distribution devices. The removable connection block allows a base module to be replaced without interrupting the supply voltage to other bus stations.

SIMATIC RF180C is integrated in SIMATIC STEP 7 via the GSDML file. SIMATIC RF180C can then be configured via the SW tool HW_Config of SIMATIC Manager or another PROFINET tool.

A pre-assembled reader cable is used to connect one or two readers to the communication module. The standard cable length is 2 m. If other reader cable lengths are required, an extension cable from 2 to 50 m in length can be used. The cable can also be assembled by the customer as required.

The data in the transponder can be accessed in the following manner: Direct addressing via absolute addresses

Error messages and operating states (tag in field, transfer, etc.) are also displayed on LEDs and support commissioning and service.

SIMATIC RF180C has two reader interfaces from which the readers are also supplied with voltage. There is a solid-state fuse in SIMATIC RF180C for the reader power supply. The maximum current permitted for the readers per SIMATIC RF180C is 1 A. It is not important here whether the current is drawn by 1 or 2 readers.

The application accesses the tag via FB45. FB45 accesses the tag via absolute addresses. For large volumes of data and complex tag operations, the FB45 can process chained commands.

Data is exchanged between SIMATIC RF180C and the application by means of acyclic data records. This ensures that a large quantity of data can be transferred from/to SIMATIC RF180C without loading the bus cycle. This is advantageous when large volumes of data are being transferred. SIMATIC RF180C can also process chained tag commands in this mode extremely quickly.

Technical specifications

Product type description	SIMATIC RF180C
Supply voltage	
• Nominal value	24 V DC
• Permissible range	20 ... 30 V DC
Current consumption	
• Without reader, typ.	100 mA
• With two readers, max.	1000 mA
Serial reader interface (gross transmission rate)	
• MOBY I/E	19200 bit/s
• MOBY U/D, RF300	19200, 57600, 115200 bit/s
Connectors	2 x connector plug M12, 8-pin
Cable length to reader	
• Standard length	2 m
• Optional preassembled cables	5 m, 10 m, 20 m, 50 m
Self-assembled cables	Reader/SLG-dependent. Up to 1000 m
Supply voltage to reader	24 V
Max. current per reader	
• 2 readers connected	0.5 A
• 1 reader connected	1.0 A
Ambient temperature	
• Operation	-0 ... 60 °C
• Storage	-40 ... +70 °C, 20 K/h
Shock load during operation acc. to IEC 61131-2	30 g
Vibratory load during operation acc. to IEC 61131-2	0.75 mm (10 ... 58 Hz) 10 g (58 ... 150 Hz)
Enclosure	
• Material	Thermoplastic (fiberglass reinforced)
• Color	IP Basic 714
• Degree of protection	IP67
Dimensions (W x H x D) in mm	
• SIMATIC RF180C without connection block	60 x 210 x 30
• SIMATIC RF180C with connection block	60 x 210 x 54
Weight	
• Base module only	210 g
• Connection block only	230 g

PROFINET/Industrial Ethernet RFID Systems

SIMATIC RF180C

Ordering data	Order No.
SIMATIC RF180C communication module For PROFINET, for connecting 2 readers; without a connection block	6GT2 002-0JD00
Accessories MOBY	
Connection block for SIMATIC RF180C for connecting 2 readers over an M12 cable connector	6GT2 002-1JD00
M12 connecting cable prefabricated, between SIMATIC RF180C and SIMATIC RF300 reader; 2m, plug angled	6GT2 891-0JH20
SLG cable for MOBY I/E/U 2 m	6GT2 091-0FH20
SLG cable for MOBY I/E/U 5 m	6GT2 091-0FH50
SLG cable for MOBY D 2 m	6GT2 691-0FH20
SLG cable for RF300 Extension cable for MOBY I/E/U/D/RF300	
• 2 m	6GT2 891-0FH20
• 5 m	6GT2 891-0FH50
• 10 m	6GT2 891-0FN10
• 20 m	6GT2 891-0FN20
• 50 m	6GT2 891-0FN50
M12 sealing caps for unused reader connections (10 units)	3RX9 802-0AA00
Accessories for connection to the network	
PROFINET cable with M12 plugs pre-assembled; for trailing	6XV1 870-8Axxx¹⁾
Cable for supply voltage pre-assembled with 7/8" plugs	6XV1 822-5Bxxx¹⁾
PROFINET standard cable 2x2, Type A not pre-assembled; minimum order quantity 20 m	6XV1840-2AH10
PROFINET M12 plug connector rugged metal housing; fast connect system; D-coded (pack of 1)	6GK1901-0DB10-6AA0
7/8" cable connector for voltage (pack of 5)	
• With pin insert	6GK1 905-0FA00
• With socket insert	6GK1 905-0FB00
IE M12 cabinet bushing for conversion from M12 (D-coded) to RJ45; (pack of 5)	6GK1901-0DM20-2AA5
IE FC RJ45 PLUG 180 RJ45 plug connector with rugged metal housing and FC connection system; straight cable outlet (pack of 1)	6GK1901-1BB10-2AA0

¹⁾ This cable is available in different lengths
(see "Passive network components")

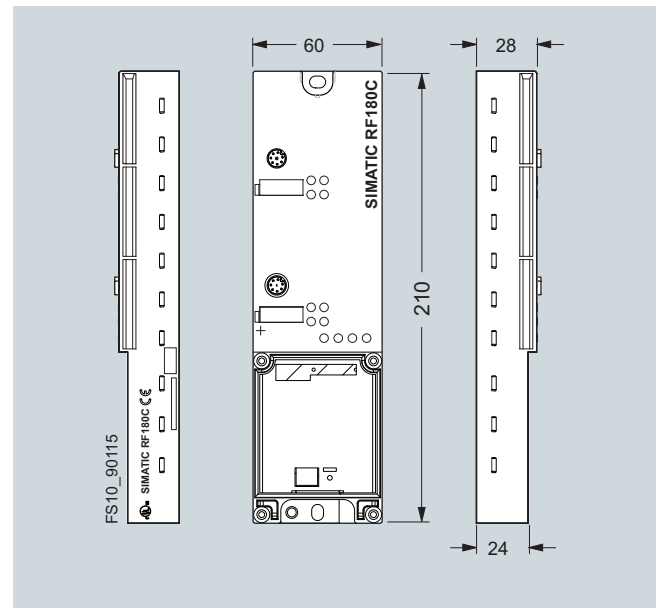
Dimensional drawings

CAD data

Dimension drawing available as CAD graphic (DXF format).

Additional information can be found in the Internet under:

http://www.automation.siemens.com/bilddb/index.asp?objKey=G_FS10_XX_90115



PROFINET/Industrial Ethernet

RFID Systems

SIMATIC RF170C

Overview



The SIMATIC RF170C is a communication module for connecting the Siemens RFID systems to the ET 200pro distributed I/O system. The readers (SLGs) of all RFID systems can be operated on the SIMATIC RF170C.

Thanks to its high degree of protection and ruggedness, ET 200pro is particularly suitable for machine-level use. The modular structure with PROFIBUS and PROFINET connection systems allows them to be used in all applications. The system-wide, plug-in connection technique ensures rapid start-up.

Benefits

- Two parallel MOBY channels ensure real-time mode at dynamic read points.
- By selecting the relevant header module, the RFID systems can be connected via PROFIBUS or PROFINET.
- The modular design with interface modules for PROFIBUS and PROFINET supports universal implementation.
- Reader connection using an 8-pin M12 connector for fast installation of all components.
- Easy changeover from ET 200X with ASM 473 to ET 200pro with SIMATIC RF170C thanks to 100 % software compatibility.
- High-performance hardware ensures fast data exchange with the SLG (reader). Consequently the data are available for the application even faster.
- Easy downloading of firmware via SIMATIC Manager for function expansions and error rectification ensure high-availability of the RFID system.
- The parameterizable RFID-specific diagnostics support start-up and troubleshooting
- A wide selection of pre-assembled connecting cables can be ordered for ET 200pro and SIMATIC RF170C. This saves time and money during installation and assures better quality.

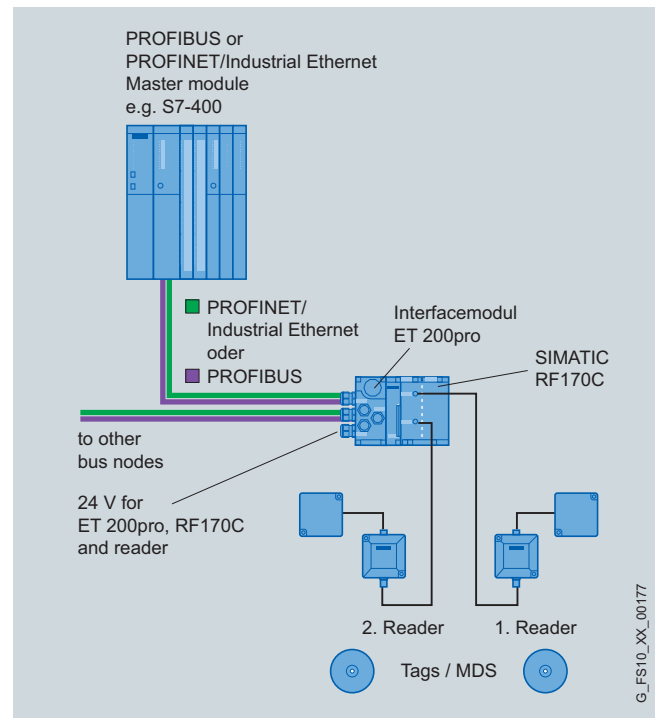
Application

The ET 200pro distributed I/O system with the SIMATIC RF170C communication module has been specially designed for a wide range of applications in industrial automation and logistics. Thanks to the high degree of protection of IP67, the SIMATIC RF170C can be installed without a control cabinet.

Used primarily for the SIMATIC RF170C:

- Mechanical engineering, automation systems, conveyor systems
- Ancillary assembly lines in the automobile industry/suppliers
- Small assembly lines

Design



Function

The SIMATIC RF170C comprises an electronics module and a connection block that must be ordered separately. The interface module is available in the PROFIBUS or PROFINET variants. For the PROFIBUS connection, you can choose from the connection systems of ECOFAST, M12, 7/8", or screwed cable gland. For the PROFINET interface module, M12, 7/8" connection is available.

Integration of SIMATIC RF170C into SIMATIC STEP 7 is achieved by means of an object manager (OM). The GSD file of the ET 200pro system is available for integration into non-Siemens systems. Then the SIMATIC RF170C can be configured by means of the software tool HW_Config of the SIMATIC Manager or another PROFIBUS/PROFINET tool.

One or two readers are connected to the interface module using an off-the-shelf reader cable. The standard length of the cable is 2 m. If other cable lengths to the reader are required, an extension cable measuring between 2 m and 50 m can be used. The cable can also be assembled by the customer as required.

In principle, access to the data in the transponder can take place as follows.

- Direct addressing via absolute addresses
- Conveniently via the MOBY file handler (MOBY I/U only) using file names

Error messages and operating states (tag in the field, transmission, etc.) are indicated additionally by means of LEDs and simplify commissioning and service.

The SIMATIC RF170C has two reader interfaces from which the readers are also supplied with power. In the SIMATIC RF170C, the power supply for the readers has an electronic fuse. The maximum permissible current per SIMATIC RF170C for the readers is 0.8 A. It is of no importance here whether the current is drawn by one or two readers.

The data in the MDS can be directly accessed by means of absolute addresses (FB/FC45, FC55) or more conveniently using the MOBY file handler (FB, FC 56) by means of the file names. When the ET 200pro is operated with a PROFINET interface, use of the FB (FB45, FB56) is mandatory.

Communication between the SIMATIC RF170C and the controller is acyclic. Consequently, a very large amount of data can be transferred to/from the SIMATIC RF170C without overloading the bus cycle. This has advantages when transferring large volumes of data. In addition, the SIMATIC RF170C can process concatenated tag commands very quickly in this mode.

Technical specifications

Product type description	SIMATIC RF170C
Ambient temperature	
• During operation	-25 ... +55 °C
• During storage	-40 ... +70 °C 20 K/h
Relative humidity	5 to max. 100 %
Atmospheric pressure	from 795 to 1080 hPa
Resistance to shock	as for ET 200pro
Vibration	as for ET 200pro
Power supply	
• Nominal value	24 V DC
• Permissible range	20.4 ... 28.8 V DC
Current consumption	
• Without reader	typ. 130 mA
• With 2 readers	Max. 1000 mA
Enclosure	
• Degree of protection	IP67
• Enclosure material	Thermoplastic (fiberglass reinforced)
• Housing color	IP Basic 714
Dimensions (W x H x D) in mm	
• SIMATIC RF170C without connection block	90 x 130 x 35
• SIMATIC RF170C with connection block	90 x 130 x 60
Weight	
• Without connection block	Approx. 270 g
• With connection block	Approx. 770 g
Serial reader interface (gross transmission rate)	MOBY I/E: 19200 baud MOBY U/D, RF300: 19200, 57600, 115200 baud
Connectors	2 x connector plug M12, 8-pin
Cable length to reader	
• Standard length	2 m
• Optional preassembled cables	5 m, 10 m, 20 m, 50 m
• Self-assembled cables	According to write/read device. Up to 1000 m
Supply voltage to reader	24 V
Max. current; 2 readers connected	0.4 A per reader
Max. current; 1 readers connected	0.8 A per reader

PROFINET/Industrial Ethernet

RFID Systems

SIMATIC RF170C

Ordering data

Order No.

SIMATIC RF170C communication module

6GT2 002-0HD00

For connecting to the distributed I/O system ET 200pro

Accessories

Connection block for SIMATIC RF170C for connection of 2 readers using M12 connectors

6GT2 002-1HD00

M12 connecting cable

prefabricated,
between SIMATIC RF180C and
SIMATIC RF300 reader;
2m, plug angled

6GT2 891-0JH20

SLG cable for MOBY I/E/U

2 m

6GT2 091-0FH20

SLG cable for MOBY I/E/U

5 m

6GT2 091-0FH50

SLG cable for MOBY D

2 m

6GT2 691-0FH20

SLG cable for RF300

Extension cable for MOBY
I/E/U/D and SIMATIC RF300

- 2 m
- 5 m
- 10 m
- 20 m
- 50 m

6GT2 891-0FH20

6GT2 891-0FH50

6GT2 891-0FN10

6GT2 891-0FN20

6GT2 891-0FN50

M12 sealing caps for unused reader connections (10 units)

3RX9 802-0AA00

Dimensional drawings

CAD data

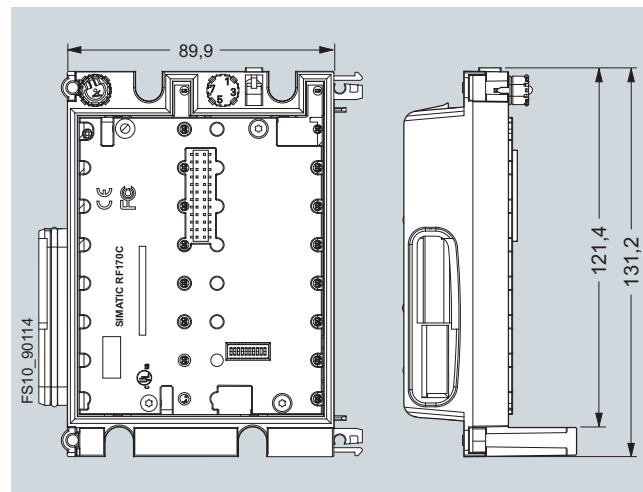
Dimension drawing available as CAD graphic (DXF format).

Additional information can be found in the Internet under:

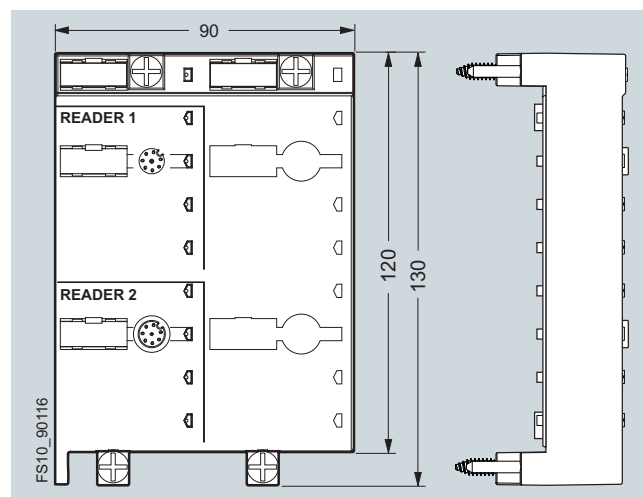
http://www.automation.siemens.com/bilddb/index.asp?objKey=G_FS10_XX_90114

and

http://www.automation.siemens.com/bilddb/index.asp?objKey=G_FS10_XX_90116



SIMATIC RF170C communications module

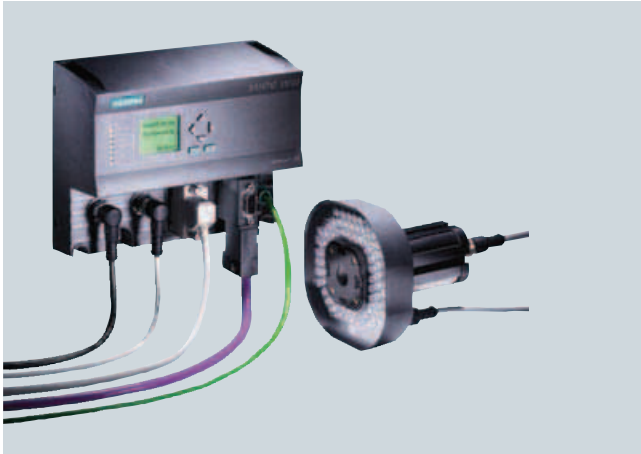


Connector block for SIMATIC RF170C

PROFINET/Industrial Ethernet Image Processing System

SIMATIC VS120

Overview



- Vision sensor for object finding and object size testing in reflected light
- VS120 finds and checks different objects and / or patterns, e.g.:
 - printed symbols (product markings on labels, packaging, etc.)
 - injection-molded parts,
 - ceramic elements,
 - ...
- Can be used in principle for the following applications:
 - position detection for Pick&Place applications,
 - checking the presence and position of objects in production,
 - checking the orientation of objects in infeed systems
- Easy configuration through presentation of the good object to be recognized. "Training" is done automatically by activating the training function of the unit.
- Parameter definition is done using the web-based operating interface and can be run on various platforms with the following requirements:
 - Browser (IE5.5 or higher),
 - JAVA-VM (MS, SUN).
- The web-based operator interface is also used for controlling the device from an HMI device. The same prerequisites apply here concerning the Browser and JAVA VM.
- Remote maintenance concept using web-based operator interface.
- Remote controlled with integrated digital inputs, PROFIBUS or PROFINET IO.
- Can be supplied as a complete package in several variations for different object sizes

Application

The intelligent vision sensor can be used for the following applications:

- Determining the position for Pick & Place applications
- Checking the presence and position of objects in production
- Checking the orientation of objects in infeed systems

Examples of possible inspection tasks and inspection objects:

- Checking the presence and position of symbols (warnings) and logos (corporate logos) on print media and packaging
- Checking the presence and position of objects in production for the quality assurance of assembly steps
- Checking the orientation of assembly items in infeed systems

Design

The SIMATIC VS 120 vision sensor offers the following image field sizes:

- 70 mm x 50 mm fixed-focus sensor head
- 40 mm x 30 mm fixed-focus sensor head
- Variable field of view with C/CS-Mount sensor head

The following components are required for use of the fixed-focus version of the SIMATIC VS120 vision sensor and are included in the scope of delivery:

- Sensor head
- Front lighting in the form of a ring light matched to the application and sensor head
- Processing unit
- Connecting cables
- CD with configuration software and assembly/operating instructions

To start up the fixed focus version you also need the following items (not included in the scope of delivery):

- Ethernet cable (see "Accessories") for connecting the evaluator to any web client. The web client, e.g. a PC with web browser installed, is used to adjust the sensor head and the lighting.

The following components are required for use of the C/CS mount version of the SIMATIC VS120 vision sensor and are included in the scope of delivery:

- Sensor head (without lens!)
- Processing unit
- Connecting cables (no connecting cable for lighting!)
- CD with configuration software and assembly/operating instructions

To start up the C/CS-Mount version you also need the following items (not included in the scope of delivery):

- C/CS-Mount lens with the required imaging properties
- Suitable light source and suitable connecting cable (see accessories)
- Ethernet cable (see "Accessories") for connecting the evaluator to any web client. The web client, e.g. a PC with web browser installed, is used to adjust the sensor head and the lighting.

Sensor head

The sensor head is equipped with:

- Extruded aluminium housing to degree of protection IP65 (fixed-focus version)
- CCD chip (640 x 480 quadratic pixels)
- Lens, permanently installed and non-adjustable (fixed focus version)
- Interface for digital transmission of image data to the processing unit

A sensor head for C/CS-Mount lenses is additionally available.

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS120

Design (continued)

Processing unit

The processing unit has:

- Plastic housing, designed for cabinetless construction (IP40)
- Connections for
 - Supply voltage 24 V DC
 - Lighting
 - Sensor head
 - Digital inputs and outputs
 - Ethernet interface (DHCP-Client, DHCP-Server, fixed IP address)
 - PROFIBUS DP
- 4-line text display for operator prompting
- 6 keys for operating the unit
- User guidance with web-based operator interface (HTML, JAVA VM)
- Access protection by means of password.

The following communication services are included:

- PROFINET IO (slave)
- PROFIBUS DP V0 (slave),
- TCP/IP native

The analysis is carried out by a powerful digital signal processor.

Front lighting

- Designed as ring light pushed onto sensor head
- Can be dismounted, and secured with different orientation on the machine
- Housing with degree of protection IP65
- Equipped with red LEDs
- Operation in flash mode
- Power control for the flash integrated in the light

Function

- Training the object test parameters using one or more good objects
- Testing an object and/or pattern with the features taken from the training
- Testing can be performed on stationary and moving objects
- Checking for a match with the reference provides a good/poor indication after comparison with set-value criteria
- Test results output to three control outputs:
 - OK: trained object and/or pattern found based on features; degree of match greater than set value
 - N_OK: trained object and/or pattern NOT found based on features; degree of match NOT greater than set value
- Position information output via PROFIBUS DP, PROFINET IO, Ethernet or with converter to RS 232 interface
- Integrated DI/O enables "stand-alone" operation without additional controller.
- Remote control via PROFIBUS DP, PROFINET IO, DI/O or Ethernet
- Remote maintenance via web-based operator interface Intranet or Internet:
 - monitoring (live image in read mode)
 - diagnostics (fault image, log information, ...)
 - system administration (software update, ...)
 - error analysis for troubleshooting for faulty readings
- Actuation of ring lighting

Mode of operation

The following steps are required for using the SIMATIC VS120:

- Mount the vision sensor and lighting.
- Manual alignment of the camera, lighting check: This is handled with the web-server integrated in the unit and the web-based operator interface contained within. The operator interface displays the camera image. In the setup phase, the sensor head can be aligned with reference to the live image in the user interface. The user interface executes on any PC with Microsoft Internet Explorer and JAVA VM installation. If the sensor head adjustment is complete, the vision sensor automatically takes over the following procedures:
 - optimization of lighting control.
 - "Training" the image processing parameters by applying a reference object
 - the result of the training is stored under one of the 64 data records
- Starting the evaluation operation requires loading a trained object record and changing into the "RUN" operating mode. The VS120 starts the evaluation after triggering.
- Depending on the trained set values and the actual values of the evaluation, one of the digital control outputs OK (good result) or N_OK (poor result) is set.

The position information is output via the PROFIBUS DP, PROFINET IO or Ethernet interface.

Programming

SIMATIC VS120 is not programmed and parameters are not defined as on standard image processing systems. It is trained for its special task, finding and testing a special object. The SIMATIC VS120 is shown a good object and the device is "trained" to this object.

The training procedure can be performed while a conveyor system is running.

Up to 64 different data records can be stored in the device and can be called up at any time by the operator or can also be called up through an external controller.

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS120

Technical specifications

Product type description	Vision Sensor SIMATIC VS120
Sensor head	
Image capture	CCD chip 1/4", 640 x 480 square pixels; full frame shutter with automatic exposure time
Image data transfer	Triggered frame transfer
Available versions	<ul style="list-style-type: none"> Fixed lens system for two different field of view sizes and mounting positions One C/CS-mount version without lens.
• Large field of view	Size of field of view: 70 mm x 50 mm for object sizes up to approx.: 60 mm x 40 mm Operating distance: 120 mm
• Small field of view	Size of field of view: 40 mm x 30 mm for object sizes up to approx.: 34 mm x 24 mm Operating distance: 85 mm
• Variable field of view	Lens can be selected by the user; hence freely selectable field of view size and object size Operating distance: dependent on the lens
Enclosure	Aluminum profile casing, anodized black
Dimensions (W x H x D) in mm	42 x 42 x 100
Degree of protection	IP65 according to DIN EN 60529 / VDE 0470-1
Ambient temperature	0 ... 50 °C
Mechanical strength	
• Vibrations	1 g (60 ... 500 Hz)
• Shock	70 g (6 ms, 3 shocks)
Lighting	
Illuminant	LED, wavelength 630 nm (red), designed as a flash of 20 µs to 10 ms, diffuse
Enclosure	Ring lamp with multiple fixing possibilities; plastic with plastic diffusing panel
Dimensions (W x H x D) in mm	102 x 102 x 26.5
Degree of protection	IP65 according to DIN EN 60529 / VDE 0470-1
Ambient temperature	0 ... 50 °C
Evaluation unit	
Operator controls	4-line text display and 6 operator buttons
Training	Fully-automatic training procedure
Number of types saved	64 different data records, can be selected via control button or digital inputs or PROFIBUS DP or PROFINET IO, network-fail-safe storage
Triggering inspection	External (via digital input, PROFIBUS DP or PROFINET IO)
Permitted object rate, max.	20 objects/s

Product type description	Vision Sensor SIMATIC VS120
Infeed direction of the objects	
<ul style="list-style-type: none"> For external triggering Setup software 	As required Software for displaying the sensor image when mounting and adjusting the sensor head and lighting. The software is provided directly by the integrated web server and can be executed on every JAVA-capable browser (preferably IE6.0).
Enclosure	Plastic, all cables can be plugged in, suitable for installation without cabinet
Dimensions (W x H x D) in mm	170 x 140 x 76
Degree of protection	IP40 according to DIN EN 60529 / VDE 0470-1
Ambient temperature	0 ... 50 °C
Mechanical strength	
• Vibrations	1 g (60 ... 500 Hz)
• Shock	70 g (6 ms, 3 shocks)
Interfaces on evaluation unit	
• Digital inputs for 24 V DC	8; of which one interrupt-capable trigger input for standard binary sensors, 7 further PLC-capable control inputs
• Digital outputs for 24 V DC	6; of which 3 quality outputs 0.5 A are for the direct activation of pneumatic valves (15-pin Sub-D socket for inputs/outputs)
• Integrated PROFIBUS DP inter- face	DP (9 pin D-sub socket) to control the testing and real-time transmission of test results
• Integrated PROFINET IO interface	RJ45 (socket) for operating software, controlling the testing and real-time transmission of test results
• Integrated Ethernet interface	RJ45 (socket) for operating software, controlling the testing and real-time transmission of test results
• Lighting control	4-pin circular connector (female) for power supply and for triggering the flash
• Sensor head interface	Digital interface (26 pin Sub-D socket) for connecting the VS120 sensor head
Power supply	
• Rated value	24 V DC
• Permitted range	20 V ... 30 V DC
Current consumption, max.	4 A, of which up to 1.5 A for supplying the pneumatic valves that can be connected

2

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS120

2

Ordering data

Order No.

SIMATIC VS120 vision sensor

Complete package for object testing; consisting of sensor head, LED front lighting, processing unit and the following cables:

- Cable between processing unit and sensor head, for lengths see below
- Cable between lighting and processing unit (except for vision sensor with variable field of view), for length see below
- Cable for power supply, length 10 m
- Cable for connecting digital I/O devices, length 10 m

Incl. documentation package for SIMATIC VS120

- Field of view 70 mm x 50 mm
 - With cable length 2.5 m
 - With cable length 10 m
- Field of view 40 mm x 30 mm
 - With cable length 2.5 m
 - With cable length 10 m
- Variable field of view, prepared for IP65 protective housing (note: supplied without light and light cable)
 - With cable length 2.5 m
 - With cable length 10 m

6GF1 120-1AA
6GF1 120-1AA01

6GF1 120-2AA
6GF1 120-2AA01

6GF1 120-3AB
6GF 1 120-3AB01

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS130-2

Overview



- The SIMATIC VS130-2 vision sensor has been developed especially for reading data matrix codes (DMC) ECC200 in an industrial environment. More 2D codes and 1D codes are also available making the vision sensor into a complete code reader:
- 1D codes (barcodes):
 - Code 39,
 - Code 128,
 - Interleave 2/5,
 - EAN13.
- 2D codes:
 - Data matrix code (DMC) according to ECC200,
 - QR (alphanumeric characters; without subversions: truncated, macro, micro),
 - PDF417 (without subversions: Macro, micro),
- SIMATIC VS130-2 reads codes on different construction elements and surfaces, e.g. (incomplete listing):
 - Paper or plastic labels,
 - Plastic parts,
 - Circuit boards,
 - Metallic objects.
- SIMATIC VS130-2 reads codes of different types of markings, e.g. (incomplete list):
 - Printed,
 - Stamped,
 - Lasered,
 - Drilled.
- No parameter definition for adapting to the various support materials and types of marking is required by the user. "Training" is performed automatically by presenting a readable code pattern. Programming and parameterization are not required.
- Can be used in principle for the following applications:
 - Coded information can be read out,
 - The coded information is compared with a defined character sequence,
 - Quality assessment of the marking process (exclusively DMC).
- Parameters are set using the web-based operator interface which runs on various platforms with the following requirements: Browser (IE5.5 and higher), JAVA-VM (MS, SUN).
- The web-based operator interface is also used for controlling the device from an HMI device. In this case, the requirements mentioned above also apply with regard to the browser and JAVA VM
- Remote maintenance concept using web-based operator interface.
- Remote controlled with integrated digital inputs, PROFIBUS or PROFINET IO.

- Can be supplied as a complete package in several variations for different object sizes
- The product is available in 6 languages (operator interface, manual and online help are available in German, English, French, Spanish, Italian and Chinese).

Application

The intelligent vision sensor VS130-2 can be used for the following applications:

- Coded information can be read out.
- The coded information is compared with a defined character sequence.
- Measurement of code quality.

Barcodes

The SIMATIC VS130-2 vision sensor reads the barcodes (Code 39, Code 128, Interleave 2/5, EAN13) in different sizes:

- Fixed focus sensor head (640 x 480): Up to 60 mm code width,
- C/CS sensor head (640 x 480 or 1024 x 768): Code width depends on the selected lens.

The main condition for reading is that the smallest code structure element (the thinnest line) has to be at least 3 pixels wide to ensure good readability.

Data matrix code

The SIMATIC VS130-2 vision sensor can decode data matrix codes of the following matrices in various sizes:

- Square: 10 x 10 dots up to 72 x 72 dots
- Rectangular: 8 x 18 dots up to 16 x 48 dots

The parameters for dot size and reading distance are defined by the optics selected and can vary over a wide range:

- Readable dot size 0.1 mm to >3 mm.
- Reading distance 80 mm to 3000 mm.

PDF417

The SIMATIC VS130-2 vision sensor can decode PDF417 in various sizes:

- Fixed focus / C/CS sensor head (640 x 480): Up to 50 lines of code, up to 7 columns of code
- C/CS sensor head (1024 x 768): Up to 80 lines of code, up to 15 columns of code.

QR

The SIMATIC VS130-2 vision sensor can decode QR in various sizes:

- Fixed focus / C/CS sensor head (640 x 480): Up to 89 x 89 dots
- C/CS sensor head (1024 x 768): Up to 145 x 145 dots.

Common properties

Code readability is basically not connected to the type of marking or support material, as long as the marked structure and the background are different optically.

Possible marking systems include e.g.:

- Laser inscription systems
- Inkjet printers

Examples of possible surfaces and materials e.g.:

- Different types of PCB.
- Plastic parts of various colors.
- Labels of various colors.
- Electronic components.
- Metallic objects, etc.

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS130-2

Design

The following components are required for use of the SIMATIC VS130-2 vision sensor and are included in the scope of delivery of a fixed-focus complete package (working distance approximately 100 mm):

- Fixed-focus sensor head (3 display field sizes available for selection).
- Front lighting in the form of a ring light matched to the application and sensor head.
- Evaluation unit.
- Cables.
- CD with mounting/operating instructions

For working distances between 80 mm and 3000 mm, "C/CS-Mount complete packages" are available:

- C/CS-Mount sensor head (standard resolution 640 x 480 [pixels], high-resolution 1024 x 768 [pixels])
- Evaluation unit.
- Cables.
- CD with mounting/operating instructions

The core of this package is a C/CS-Mount sensor head whose imaging behavior is determined with a suitable C/CS-Mount lens. The lens is not included in the package and can be selected under "Accessories". The lighting (incl. cables) must be selected in accordance with the working distance and are not included in the "C/CS-Mount complete packages".

The following is additionally required for commissioning (not included in scope of delivery):

- Ethernet cable (see "Accessories") for connecting the evaluator to any web client. The web client, e.g. a PC with web browser installed, is used to adjust the sensor head and the lighting.

Sensor head

The sensor head is equipped with:

- Extruded aluminium housing with degree of protection IP65
- CCD chip (640 x 480 square pixels, 1024 x 768 square pixels).
- Lens, permanently installed (possible field of view sizes: 70 x 50 mm, 40 x 30 mm, 20 x 15 mm for 640 x 480 pixels in each case) or prepared for C/CS-Mount lens (field of view size can be freely selected for 640 x 480 pixels or 1024 x 768 pixels)
- Interface for digital transmission of image data to the evaluation unit.

The fixed-focus sensor head offers degree of protection IP65. Even when C/CS-Mount lenses are used, degree of protection IP65 can be achieved by use of the optional protective housing.

Evaluation unit

The evaluation unit has:

- Plastic housing designed for cabinet-free mounting (IP40).
- Connections for:
 - Supply voltage 24 V DC.
 - Lighting
 - Sensor head
 - Digital inputs and outputs
 - PROFIBUS DP.
 - Ethernet (DHCP client, DHCP server, fixed IP address).
- Operator prompting on the device (4-line text display, 6 keys).
- Operator prompting through web-based user interface (HTML, JAVA VM).
- Access protection by means of password.

The following communication services are included:

- PROFINET IO (slave)
- PROFIBUS DP V0 (slave),
- TCP/IP native.

Frontlighting

- Designed as ring light, pushed onto sensor head or lens housing
- Can be dismounted, and secured with different orientation on the machine
- Housing with degree of protection IP65
- Equipped with various LEDs for different applications:
 - Not focussed, for small reading distances (0.08 m to 0.5 m)
 - Focussed, for large reading distances (0.5 m to 3 m).
 - Infrared LED, for daylight-independent operation
 - Red LED for high light intensity
 - Operation in flash mode
 - Power control for the flash integrated in the light

Function

The following functions are available:

- "Training" the vision sensor with reference to a code (DMC) pattern.
- Coded information can be read out.
- The coded information is compared with a defined character sequence.
- Measurement of code quality.
- Codes on moving or stationary objects can be processed.
- Output of the decoding results to three control outputs:
 - READ: Code is decoded.
 - MATCH: Decoded code content exactly matches the reference.
 - N_OK: Code cannot be decoded.
- Output of the decoded DMC information via PROFIBUS DP, Ethernet or by means of a converter on the RS232 interface.
- Formatting of the output.
- Integrated DI/Os, for example, for "stand-alone" mode without additional control.
- Remote control via PROFIBUS DP, PROFINET IO or DI/O or Ethernet.
- Remote maintenance is possible through web-based Intranet or Internet user interface:
 - Monitoring (live image in read mode).
 - Diagnostics (fault pattern, log information, etc.).
 - System administration (software update, etc.).
 - Fault analysis for finding the cause of faulty readings.
- Actuation of ring lighting

Mode of operation

When using the SIMATIC VS130-2, the following steps are necessary:

- Mount the vision sensor and lighting.
- Manually align the camera, check the lighting:

The web server integrated into the device complete with web-based user interface is provided for this purpose. The user interface presents the camera image and the decoded result. In the setup phase, the sensor head can be aligned with reference to the live image in the user interface. The user interface executes on any PC with Microsoft Internet Explorer and JAVA VM installation. When the sensor head is correctly adjusted, the vision sensor performs the subsequent tasks autonomously:

 - Optimization of lighting control.
 - "Training" of the image processing parameters by presenting a code sample. The image processing parameters for the type of code (carrier material, marking type, dot size, matrix size, etc.) are stored. No further parameter inputs are required.
- Evaluation mode (RUN mode) is started using the training results and a read is started:

Feeding of the Data Matrix Code can be carried out manually or via a conveyor unit. The Data Matrix Code must be located within the viewing window at the moment of triggering and is permitted to move at a maximum speed of 5000 mm/s. Any angle of rotation within the viewing window of the sensor head is permitted.

SIMATIC VS130-2 generally has three operating modes that can also be combined:

- Operating mode 1 "Code decoding":

The character string is transferred to the controller filtered or unfiltered. Filters can be separators, start position and length of the character string, or company-specific ID numbers.
- Operating mode 2 "Decoded information is compared with a character string":

The comparison can refer to the decoded string or to only a certain part. Comparison of parts is possible using the filter functions mentioned above.
- Operating mode 3 "Measurement of code quality":

The measurement can be absolute or relative. With the relative method, the reading system is calibrated by presenting a reference sample during the training phase. In this mode, the quality values measured are based on the reference sample. VS130-2 can, however, also use absolute measurement. In this case, the calibration step is omitted and a reference sample is not necessary.
- Depending on the operating mode and the result of the analysis, one of the digital control outputs READ, MATCH or N_OK is set.
- The decoded information is output, over PROFIBUS DP, PROFIBUS IO, Ethernet or a serial interface (converter required) as preferred and on the device display.

Programming

SIMATIC VS130-2 is not programmed or parameterized like conventional image processing systems. It configures the lighting and trains the algorithms without the need for user settings with reference to a code sample or during the first read.

The training can be performed when the conveyor system is running. Self-parameterization can be started externally using the operator buttons on the device or remotely from the user interface. Self-parameterization is also activated during reading by a failed attempt at reading. Maximum reading reliability is achieved thanks to independence from user inputs and due to automatic self-parameterization.

Up to 15 different parameter records can be stored in the device. These can be called up at any time by the user or by an external controller and can be used for reading code without the need to repeat the training phase.

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS130-2

Technical specifications

Product type description	SIMATIC VS 130-2 Vision Sensor
Sensor head	
Image capture	CCD chip 1/4", 640 x 480 square pixels; CCD chip 1/3", 1024 x 768 square pixels; Full frame shutter with automatic exposure
Image data transfer	Triggered frame transfer
Available versions	<ul style="list-style-type: none"> Non-adjustable lens for three different image field sizes and reading distances, only available for 640 x 480 Two C/CS-Mount versions (without lens): User-defined image field size and scanning distance
• Large field of view	Size of field of view: 70 mm x 50 mm Dot size: 0.60 mm - 3.5 mm (edge length) Operating distance: 120 mm
• Medium-sized field of view	Size of field of view: 40 mm x 30 mm Dot size: 0.35 mm - 2.0 mm (edge length) Operating distance: 85 mm
• Small field of view	Size of field of view: 20 mm x 15 mm Dot size: 0.2 mm - 1.0 mm (edge length) Operating distance: 75 mm
• Variable field of view	Freely selectable image field size, scanning distance and sensor resolution, depending on: <ul style="list-style-type: none"> Selected lens Selected sensor head resolution 640 x 480 pixels or 1024 x 768 pixels Minimum requirement: 5 pixels/dot
Housing	Extruded aluminum housing, black anodized
Dimensions (W x H x D) in mm	42 x 42 x 100
Degree of protection	IP65 according to DIN EN 60529 / VDE 0470-1
Ambient temperature	0 ... 50 °C
Mechanical strength	<ul style="list-style-type: none"> Vibrations Shock
• Vibrations	1 g (60 ... 500 Hz)
• Shock	70 g (6 ms, 3 shocks)
Lighting	
Illuminant	LED, wavelength 630 nm (red) or infra-red, designed as a flash of 20 µs to 10 ms, diffuse or clear
Housing	Ring lamp of plastic, working area up to 500 mm or Ring lamp of metal, working area up to 3000 mm, suitable for lens cover
Dimensions (W x H x D) in mm	<ul style="list-style-type: none"> Plastic Metal
• Plastic	102 x 102 x 26.5
• Metal	116 x 116 x 42
Degree of protection	IP65 acc. to DIN EN 60529 / VDE 0470-1
Ambient temperature	0 ... 50 °C

Product type description	SIMATIC VS 130-2 Vision Sensor
Processing unit	
Operator controls	4-line text display and 6 operator buttons
"Teach-in" of DMC ("training")	Fully-automatic training procedure
Number of objects saved	15 different parameter sets, selectable using operator buttons or digital inputs, powerfail-proof storage
Triggering inspection	External (through digital input)
Permissible object rate, max.	20 reads/s
Infeed direction of the objects	Any
• For external triggering	
• Setup software	Software for displaying the sensor image when mounting and adjusting the sensor head and lighting. The software makes the integral web server available directly and requires an installed browser (Internet Explorer 5.5 and higher) and installed JAVA-VM (Microsoft or SUN).
Housing	Plastic, all cables can be plugged in, suitable for installation without cabinet
Dimensions (W x H x D) in mm	170 x 140 x 76
Degree of protection	IP40 according to DIN EN 60529 / VDE 0470-1
Ambient temperature	0 ... 50 °C
Mechanical strength	<ul style="list-style-type: none"> Vibrations Shock
• Vibrations	1 g (60 ... 500 Hz)
• Shock	70 g (6 ms, 3 shocks)
Interfaces on processing unit	<ul style="list-style-type: none"> Digital inputs for 24 V DC Digital outputs for 24 V DC Integral PROFIBUS DP interface Integral PROFINET I/O interface Integrated Ethernet interface Lighting control Sensor head interface
• Digital inputs for 24 V DC	8; of which one interrupt-capable trigger input for standard binary sensors, 7 further PLC-capable control inputs
• Digital outputs for 24 V DC	6; of which 3 quality outputs 0.5 A are for the direct activation of pneumatic valves (15-pin Sub-D socket for inputs/outputs)
• Integral PROFIBUS DP interface	DP (9-pin Sub-D socket) for real-time transfer of the test results
• Integral PROFINET I/O interface	RJ45 (socket) for operator software, real-time transfer of test results and process interfacing
• Integrated Ethernet interface	RJ45 (socket) for operator software, transfer (not real-time) of test results and process interfacing
• Lighting control	4-pin circular connector (female) for power supply and for triggering the flash
• Sensor head interface	Digital interface (26-pin Sub-D socket) for connecting the VS110 sensor head
Supply voltage	<ul style="list-style-type: none"> Nominal value Permitted range
• Nominal value	24 V DC
• Permitted range	20 ... 30 V DC
Current consumption, max.	4 A, of which up to 1.5 A for supplying the pneumatic valves that can be connected

Ordering data	Order No.
SIMATIC VS130-2 vision sensor Complete package for object inspection; comprising sensor head, LED incident light (ring lamp 6GF9 004-8BA), processing unit and the following cables: <ul style="list-style-type: none"> • Cable between processing unit and sensor head, for lengths see below • Cable between lighting and processing unit (except for vision sensor with variable field of view), for length see below • Cable for power supply, length 10 m • Cable for connecting digital I/O devices, length 10 m Incl. documentation package for SIMATIC VS130-2	
<ul style="list-style-type: none"> • Field of view 70 mm x 50 mm <ul style="list-style-type: none"> - With cable length 2.5 m - With cable length 10 m 	6GF1 130-1BA 6GF1 130-1BA01
<ul style="list-style-type: none"> • Field of view 40 mm x 30 mm <ul style="list-style-type: none"> - With cable length 2.5 m - With cable length 10 m 	6GF1 130-2BA 6GF1 130-2BA01
<ul style="list-style-type: none"> • Field of view 20 mm x 15 mm <ul style="list-style-type: none"> - With cable length 2.5 m - With cable length 10 m 	6GF1 130-4BA 6GF1 130-4BA01
<ul style="list-style-type: none"> • Variable field of view with 640 x 480 pixels and prepared for IP65 protective housing (note: supplied without light and light cable) <ul style="list-style-type: none"> - With cable length 2.5 m - With cable length 10 m 	6GF1 130-3BB 6GF1 130-3BB01
<ul style="list-style-type: none"> • Variable field of view with 1024 x 768 pixels and prepared for IP65 protective housing (note: supplied without light and light cable) <ul style="list-style-type: none"> - With cable length 2.5 m - With cable length 10 m 	6GF1 130-3BC 6GF1 130-3BC01

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS720

Overview



SIMATIC VS720A series intelligent cameras:

- Can be used for a wide range of applications in the automotive industry/automotive supplier industry, manufacturing and assembly technology, mechanical engineering, electrical engineering, packaging, pharmaceuticals, food and beverages
- Compact stand-alone image processing systems for automatic inspection, production monitoring and object recognition
- All-in-one housing for image capture, image processing and communication interface
- In-process deployment thanks to small dimensions of the intelligent cameras
- Performs several inspection tasks in one inspection cycle
- Stand-alone operation or integration in flexible factory automation environments
- Simple and fast operation through configuration and parameter assignment
- Visualization of live or error images, frame/detail and result tables
- Scalable: Performance, resolution, monochrome or color image processing
- Visualization of inspection images, result tables with VS Link of VS Link PROFIBUS
- User-friendly and easy configuration of inspection requirements using SIMATIC Spectation software
- VS Link software for configuration of central output of inspection images and result display
- WinCC flexible and WinCC Integration with VS720 HMI Controls
- Integration in plant automation using digital signals, PROFINET IO, Industrial Ethernet and PROFIBUS DP communication

SIMATIC VS720-S series intelligent cameras

- Rugged stainless steel housing in V4A steel
- Compact, space-saving construction
- Lens protection barrel made of plastic or stainless steel with optical glass
- Insensitive to humidity – high degree of protection IP68
- Highly flexible cables with rugged M12 connectors
- High processing speed and lots of space for test programs
- Configured in the same manner as the VS720A series
- Migration is possible: VS720A to VS720S
- WinCC flexible and WinCC Integration with VS720 HMI Controls
- Integration in plant automation using digital signals, PROFINET IO, Industrial Ethernet and PROFIBUS DP communication

SIMATIC integration included

Apart from the well-proven PROFIBUS DP communication, all series A / series S cameras also offer PROFINET for high-performance real-time communication on an Ethernet basis. Standard function blocks support easy communication to the PN/PB CPUs of SIMATIC S7-300 and S7-400. Standard function blocks also support easy communication between the camera and SIMATIC S7 PLC. The function blocks can be found on the SIMATIC Spectation CD.

Application

The intelligent cameras of the SIMATIC VS720 form a complete image processing system.

Compact design, networking through PROFINET IO, PROFIBUS DP and Industrial Ethernet as well as powerful image processing functions permit use in the production industry for automatic inspection, production monitoring and object recognition.

The new VS720A cameras support a higher processing speed and extended PROFINET IO communication to the SIMATIC S7 PN/PB CPUs. This supports simple integration in SIMATIC. The VS721A, VS722A and VS723A feature new CMOS / CCD sensors with considerably enhanced image capture properties.

Application (continued)

Typical applications for the VS720 intelligent cameras:

	VS721A	VS722A	VS723A	VS723-S	VS723-2	VS724	VS724A	VS724-S	VS725	VS725-S	VS726A
Performance: Basic	•	•									
Performance: Medium			•		•	•			•		
Performance: High Speed				•			•	•		•	•
Degree of protection IP68				•				•		•	
VGA resolution	•	•	•	•					•	•	•
XGA resolution					•						
SXGA resolution						•	•	•			
Color recognition									•	•	•
Completeness check	•	•	•	•	•	•	•	•	•	•	•
Form inspection	•	•	•	•	•	•	•	•	•	•	•
Pattern comparison	•	•	•	•	•	•	•	•	•	•	•
Measurement		•	•	•	•	•	•	•	•	•	•
Position/orientation detection	•	•	•	•	•	•	•	•	•	•	•
Plain text reading, comparison	•	•	•	•	•	•	•	•	•	•	•
1D ¹⁾ -/2D ²⁾ code reading	•	•	•	•	•	•	•	•	•	•	•

¹⁾ Supported 1D codes:

Interleaved 2-out-of-5, USS-128, USS-39, UPC/EAN, UPC/EAN-128 Composite, UPC/EAN Composite, Codabar, PharmaCode, PDF417, Micro PDF 417BC412, RSS-14, RSS Expanded Composite, RSS Limited Composite, RSS-14 Composite, RSS Expanded, RSS Limited Code 93, POSTNET, Planet

²⁾ Supported 2D codes:

ECC000, ECC050, ECC080, ECC100, ECC140, ECC200, Snowflake

Design

All intelligent cameras of the SIMATIC VS 720 series combine all functions such as image recording, image processing, result generation and communication in one compact housing.

Features:

- Non-interchangeable integrated interfaces (RJ-45 or M12 with the VS72x-S):
 - Power supply (24 V DC), digital inputs and digital outputs
 - Ethernet communications port
- Digital cameras for evaluation of gray scale pictures
 - Resolution 640 x 480 (square pixels)
 - Resolution 1024 x 768 (square pixels)
 - Resolution 1280 x 1024 (square pixels)
 - Scalable processing performance (three performance levels)
- Digital camera for evaluation of colors
 - Resolution 640 x 480 (square pixels)

Additionally required:

- Power supply 24 V DC, 2 A
- Lenses (image processing system accessories)
- Lighting equipment (image processing system accessories, www.siemens.com/simatic-sensors/mv)

Use of lenses, a lens barrel and intermediate rings for the VS720-S stainless-steel cameras



Stainless-steel camera with intermediate ring and plastic lens barrel



Stainless-steel camera with stainless-steel lens barrel

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS720

Design (continued)

The following table shows

- which lenses are suitable for the VS723-S, VS724-S and VS725-S stainless-steel cameras and
- whether one or several intermediate rings are necessary:

Lens order No.	Lens type	Intermediate ring 6GF9008-2AB required (quantity)	
		for plastic lens barrel 6GF9008-2AA	for stainless-steel lens barrel 6GF9008-2AA01
6GF9001-1AV	Lens CINEGON 1.8/4.8 mm	1	Nor required
6GF9001-1AE	Lens CINEGON 1.4/8 mm	1	Not required
6GF9001-1AJ	Lens CINEGON 1.4/12 mm	1	Not required
6GF9001-1AK	Lens XENOPLAN 1.4/17 mm	1	Not required
6GF9001-1AL	Lens XENOPLAN 1.4/23 mm	1	Not required
6GF9001-1AQ	Lens XENOPLAN 2.0/28 mm	1	Not required
6GF9001-1AF	Lens XENOPLAN 1.9/35 mm	1	Not required
6GF9001-1AU	Lens XENOPLAN 2.8/50 mm	1	Not required
6GF9001-1AN	Macro system lens COMONON 2.8/50 mm	Lens is not suitable for lens barrel	
6GF9001-1BE01	Mini lens 8.5 mm, 1:1.5	1	Not required
6GF9001-1BL01	Mini lens 12 mm, 1:1.4	Not required	Not required
6GF9001-1BF01	Mini lens 16 mm, 1:1.4	1	Not required
6GF9001-1BG01	Mini lens 25 mm, 1:1.4	1	Not required
6GF9001-1BH01	Mini lens 35 mm, 1:1.6	1	Not required
6GF9001-1BJ01	Mini lens 50 mm, 1:2.8	1	Not required
6GF9001-1BK01	Telephoto lens 75 mm, 1:2.8	2	1

Function

Camera functions

- Inspection start/stop
- Electronic shutter (exposure control)
- Extremely sharp images even with fast moving objects
- Full or partial image (number of pixels freely selectable)
- Rapid image sequences thanks to image capture and simultaneous image processing
- Internal or external (interrupt) control of image recording
- Simultaneous control of up to four light sources
- Multi-camera inspection by linking results from several cameras using Ethernet communication
- Output of live/warning/error images via Industrial Ethernet
- Frame transfer rate depending on sensor used
 - 8, 19, 30, 60, 75 frames / second
 - Section of a frame possible (shorter image loading time achievable)
- Permanent storage of various inspection programs for different inspection objects
- Selecting from among various inspection programs is possible

Visualization functions

HMI Controls for VS720 for centralized operation and monitoring using SIMATIC HMI (WinCC flexible, WinCC) of one or more VS720 intelligent cameras during runtime

- Visualization / archiving of images of one or more VS720 cameras
- Display of results
- Archiving of results in CSV files
- Remote control of the VS720 cameras

VS Link and VS Link PROFIBUS are used for the central visualization of live, warning and fault images without the PC and as a gateway between Industrial Ethernet and PROFIBUS DP.

- Color or monochrome monitors can be used
- Resolutions of 640 x 480, 1024 x 768 and 1280 x 1024 are supported
- Network transition: Industrial Ethernet (10/100 Mbaud) / PROFIBUS DP
- Visualization of images from several intelligent cameras in an Ethernet network
- Simultaneous display of several images and result tables
- Freezing of images for observation by operator
- Facility for user-specific division of screen

Function (continued)

Mode of operation of the intelligent camera

- Direct evaluation:
The recorded images are processed by the fast CPU using the selected inspection program.
- High cycle rates:
Image exposure is performed while the previously exposed image is being processed in parallel.
- Communication through integral interfaces (configuration, transfer of images, productive data for passing on of result, trigger for image recording)
- Boot capability:
When the external voltage is applied, image processing can be activated immediately because the inspection program is memory resident.
- Script programming:
For controlling the sequence of the inspection task, performing several inspections on the same image, carrying out mathematical calculations with values from image evaluation, communicating with external devices
- Digital I/O signals:
Available for controlling the recording of the image as well as for forming the result for controlling the process

Programming: Spectation configuration tool

- For online/offline creation of inspection programs for VS720 intelligent cameras;
the programs can then be tested and transferred to the intelligent camera
 - Offline - Test programs can be configured and tested using the emulator.
 - Online - Configuring over Ethernet
 - Several intelligent cameras can be configured from one programming device/PC
- Project management for
 - Independent inspection programs of the intelligent camera
 - Specific system programs of the intelligent camera
- Remote diagnosis is possible over the Internet
- Executes on programming device/PC with Windows XP

Surface

- Windows-compatible menu prompting
- Expanded toolbar for selection of frequently used functions
- SoftSensor toolbar for selection of SoftSensors for solving the test
- The result window contains the result table with SoftSensors and assigned values, as well as the sensor characteristics in the form of graphs or histograms.
- Positioning of SoftSensors by selecting and mouse click
- Graphic display of test images and SoftSensors
- SoftSensor display can be complete or selective
- Status line with x and y coordinates, exposure value and capacity utilization of the intelligent camera

Inspection and recognition functions

- Presence check
- Position detection
- Pattern comparison
- Position and orientation detection
- Measurement of radii, clearances and angles
- 1D/2D code reading
- Plain text reading and comparison (OCR/OCV)
- Inspection of color quality
- Checking for color falsification;
color differentiation (65000 to 16.7 million colors)
- Inspection of color luminosity
- Inspection of pattern recognition (color, size, coordinates)

User-triggered new learning and resetting of SoftSensor parameters:

- Search for pattern
- Search for object
- OCR
- Code
- Color

Communication functions

- From one intelligent camera to another
- Intelligent camera to automation system (SIMATIC S7-300/S7-400):
 - PROFINET IO
 - Industrial Ethernet
 - PROFIBUS DP (VS Link PROFIBUS required)
- Intelligent camera to external devices – e.g. robots
- Intelligent camera to VS Link or VS Link PROFIBUS
- Intelligent camera to PG/PC (engineering)
- Intelligent camera to PG/PC (productive data)

VS Link software

- For configuration of VS Link and VS Link PROFIBUS functionalities
- Executes on programming device/PC with Windows XP

Configuration facilities

- Communication from intelligent camera to VS Link or VS Link PROFIBUS
- Configuration of HMI
- Configuration and positioning of image windows and result tables

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS720

Technical specifications

Product type description	SIMATIC VS721A	SIMATIC VS722A
Camera		
Type	Evaluation of gray scale image	Evaluation of gray scale image
Image capture	640 x 480 pixels CMOS, 1/3"	640 x 480 pixels CCD, 1/3"
Pixel size	6.0 µm x 6.0 µm	7.4 µm x 7.4 µm
Exposure time	10 µs ... 1 s (global shutter)	10 µs ... 1 s (global shutter)
Frame transfer	60 fps	60 fps
Flash / DRAM memory	16 MB / 64 MB	16 MB / 64 MB
Performance	Basic	Basic
Partial image capture	Yes	Yes
Lens mount	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)
Additional features	Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources
Interfaces		
Interface 1	RJ-45 plug for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 8 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal 	RJ-45 plug for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 8 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal
Interface 2	RJ-45 plug for <ul style="list-style-type: none"> • PROFINET IO RT • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud) 	RJ-45 plug for <ul style="list-style-type: none"> • PROFINET IO RT • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud)
HMI operation	HMI Controls VS720	HMI Controls VS720
Monitor connection	Through VS Link	Through VS Link
General data		
Degree of protection	IP51	IP51
Enclosure material	Plastic	Plastic
Supply voltage	24 VDC ±10 %	24 VDC ±10 %
Current consumption	300 mA	300 mA
Ambient temperature	0 ... 45° C (32 ... 113° F), no condensation	0 ... 45° C (32 to 113 °F), no condensation
Dimensions (W x H x D) in mm	60 x 112 x 30 (without lens); additional 50 mm cable connection	60 x 112 x 30 (without lens); additional 50 mm cable connection

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS720

Technical specifications (continued)

Product type description	SIMATIC VS723A	SIMATIC VS723-2
Camera		
Type	Evaluation of gray scale image	Evaluation of gray scale image
Image capture	640 x 480 pixels CCD, 1/3"	1024 x 768 pixels CCD, 1/3"
Pixel size	7.4 µm x 7.4 µm	4.65 µm x 4.65 µm
Exposure time	10 µs ... 1 s (global shutter)	10 µs ... 1 s (global shutter)
Frame transfer	60 fps	19 fps
Flash / DRAM memory	16 MB / 64 MB	16 MB / 64 MB
Performance	Medium	Medium
Partial image capture	Yes	Yes
Lens mount	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)
Additional features	Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources
Interfaces		
Interface 1	RJ-45 plug for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 8 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal 	RJ-45 plug for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 8 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal
Interface 2	RJ-45 plug for <ul style="list-style-type: none"> • PROFINET IO RT • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud) 	RJ-45 plug for <ul style="list-style-type: none"> • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud)
HMI operation	HMI Controls VS720	HMI Controls VS720
Monitor connection	Through VS Link	Through VS Link
General data		
Degree of protection	IP51	IP51
Enclosure material	Plastic	Plastic
Supply voltage	24 VDC ±10 %	24 VDC (20 to 28 VDC)
Current consumption	300 mA	300 mA
Ambient temperature	0 ... 45° C (32 to 113 °F), no condensation	0 ... 45 °C (32 to 113 °F), no condensation
Dimensions (W x H x D) in mm	60 x 112 x 30 (without lens); additional 50 mm cable connection	60 x 112 x 30 (without lens); additional 50 mm cable connection

2

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS720

Technical specifications (continued)

Product type description	SIMATIC VS724	SIMATIC VS724A	SIMATIC VS725	SIMATIC VS726A
Camera				
Type	Evaluation of gray scale image	Evaluation of gray scale image	Color	Color
Image capture	1280 x 1024 pixels CCD, 1/2"	1280 x 1024 pixels CCD, 1/2"	640 x 480 pixels CCD, 1/4"	640 x 480 pixels CCD, 1/4"
Pixel size	4.65 µm x 4.65 µm	4.65 µm x 4.65 µm	5.6 µm x 5.6 µm	5.6 µm x 5.6 µm
Exposure time	10 µs ... 1 s (global shutter)	10 µs ... 1 s (global shutter)	10 µs ... 1 s (global shutter)	10 µs ... 1 s (global shutter)
Frame transfer	8 fps	8 fps	30 fps	30 fps
Flash / DRAM memory	16 MB / 64 MB	16 MB / 128 MB	16 MB / 64 MB	16 MB / 128 MB
Performance	Medium	High Speed	Medium	High Speed
Partial image capture	Yes	Yes	Yes	Yes
Lens mount	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)
Additional features	Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources
Interfaces				
Interface 1	RJ-45 plug for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 8 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal 	RJ-45 plug for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 8 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal 	RJ-45 plug for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 8 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal 	RJ-45 plug for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 8 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal
Interface 2	RJ-45 plug for <ul style="list-style-type: none"> • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud) 	RJ-45 plug for <ul style="list-style-type: none"> • PROFINET IO RT • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud) 	RJ-45 plug for <ul style="list-style-type: none"> • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud) 	RJ-45 plug for <ul style="list-style-type: none"> • PROFINET IO RT • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud)
HMI operation	HMI Controls VS720	HMI Controls VS720	HMI Controls VS720	HMI Controls VS720
Monitor connection	Through VS Link	Through VS Link	Through VS Link	Through VS Link
General data				
Degree of protection	IP51	IP51	IP51	IP51
Enclosure material	Plastic	Plastic	Plastic	Plastic
Supply voltage	24 VDC (20 to 28 VDC)	24 VDC (20 to 28 VDC)	24 VDC (20 to 28 VDC)	24 VDC (20 to 28 VDC)
Current consumption	300 mA	300 mA	300 mA	300 mA
Ambient temperature	0 ... 45° C (32 to 113 °F), no condensation	0 ... 45° C (32 to 113 °F), no condensation	0 ... 45° C (32 to 113 °F), no condensation	0 ... 45° C (32 to 113 °F), no condensation
Dimensions (W x H x D) in mm	60 x 112 x 30 (without lens); additional 50 mm cable connection	60 x 112 x 30 (without lens); additional 50 mm cable connection	60 x 112 x 30 (without lens); additional 50 mm cable connection	60 x 112 x 30 (without lens); additional 50 mm cable connection

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS720

Technical specifications (continued)

Product type description	SIMATIC VS723-S	SIMATIC VS724-S
Camera		
Type	Evaluation of gray scale image	Evaluation of gray scale image
Image capture	640 x 480 pixels CCD; 1/3"	1280 x 1024 pixels CCD; 1/2"
Pixel size	7.4 µm x 7.4 µm	4.65 µm x 4.65 µm
Exposure time	10 µs ... 1 s (global shutter)	10 µs ... 1 s (global shutter)
Frame transfer	75 fps	8 fps
Flash / DRAM memory	16 MB / 128 MB	16 MB / 128 MB
Performance	High Speed	High Speed
Partial image capture	Yes	Yes
Lens mount	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)
Additional features	Integrated flash control of up to 4 light sources	Integrated flash control of up to 4 light sources
Interfaces		
Interface 1	M12 x 8 industrial plug connector for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 6 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal 	M12 x 8 industrial plug connector for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 6 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal
Interface 2	M12 x 8 industrial plug connector for <ul style="list-style-type: none"> • PROFINET IO RT • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud) 	M12 x 8 industrial plug connector for <ul style="list-style-type: none"> • PROFINET IO RT • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud)
HMI operation	HMI Controls VS720	HMI Controls VS720
Monitor connection	Through VS Link	Through VS Link
General data		
Degree of protection	IP68	IP68
Enclosure material	Stainless steel V4A	Stainless steel V4A
Supply voltage	24 VDC (20 to 28 VDC)	24 VDC (20 to 28 VDC)
Current consumption	300 mA	300 mA
Ambient temperature	0 ... 45° C (32 to 113 °F), no condensation	0 ... 45° C (32 to 113 °F), no condensation
Dimensions (W x H x D) in mm	66 x 120 x 73.2 (incl. protective barrel)	66 x 120 x 73.2 (incl. protective barrel)

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS720

Technical specifications (continued)

Order No.	
Product type description	SIMATIC VS725-S
Camera	
Type	Color
Image capture	640 x 480 pixels CCD; 1/4"
Pixel size	5.6 µm x 5.6 µm
Exposure time	10 µs ... 1 s (global shutter)
Frame transfer	30 fps
Flash / DRAM memory	16 MB / 128 MB
Performance	High Speed
Partial image capture	Yes
Lens mount	CS-Mount CS-Mount to C-Mount adapter ring, 5 mm ring for VS720 series (available separately)
Additional features	Integrated flash control of up to 4 light sources
Interfaces	
Interface 1	M12 x 8 industrial plug connector for <ul style="list-style-type: none"> • 24 V power supply • Digital I/O 24 V for 6 freely configurable non-isolated channels: <ul style="list-style-type: none"> - Digital inputs with input current up to 1.5 mA, current-sinking - Digital outputs, 50 mA, short-circuit-proof, current source, active high signal
Interface 2	M12 x 8 industrial plug connector for <ul style="list-style-type: none"> • PROFINET IO RT • PROFIBUS DP (VS Link PROFIBUS) • Ethernet TCP/IP (10/100 Mbaud)
HMI operation	HMI Controls VS720
Monitor connection	Through VS Link
General data	
Degree of protection	IP68
Enclosure material	Stainless steel V4A
Supply voltage	24 VDC (20 to 28 V DC)
Current consumption	300 mA
Ambient temperature	0 ... 45 °C (32 to 113 °F), no condensation
Dimensions (W x H x D) in mm	66 x 120 x 73.2 (incl. protective barrel)

Ordering data

Order No.

SIMATIC VS721A CMOS Intelligent camera for simple image processing tasks; with 1/3" CMOS sensor chip, image format 640 x 480 pixels, can be configured with Spectation V2.8 and higher, PROFINET and TCP/IP communication	6GF1 721-0AA11
SIMATIC VS722A Basic Intelligent camera for standard image processing tasks; with 1/3" CCD sensor chip, image format 640 x 480 pixels, can be configured with Spectation V2.8 and higher, PROFINET and TCP/IP communication	6GF1 722-0AA11
SIMATIC VS723A Performance Intelligent camera with average processing speed and high clock rates; with 1/3" CCD sensor chip, image format 640 x 480 pixels, can be configured with Spectation V2.8 and higher, PROFINET and TCP/IP communication	6GF1 723-0AA11
SIMATIC VS723-2 Medium Resolution Intelligent camera for medium resolutions; with 1/3" CCD sensor chip, image format 1024 x 768 pixels, can be configured with Spectation, V2.6 Ethernet TCP/IP interface	6GF1 723-1AA01
SIMATIC VS723-S High Speed Intelligent stainless-steel camera with high processing speed, with IP68 degree of protection; with 1/3" CCD sensor chip, image format 640 x 480 pixels, can be configured with Spectation as of V2.8, PROFINET and TCP/IP interface, with lens barrel	6GF1 723-0BA
SIMATIC VS724A High Resolution Intelligent camera for high resolution; with 1/2" CCD sensor chip, image format 1280 x 1024 pixels, can be configured with Spectation V2.8 and higher, PROFINET and TCP/IP communication	6GF1 724-0AA11
SIMATIC VS724-S High Speed/High Resolution Intelligent stainless-steel camera with high processing speed, with IP68 degree of protection; with 1/2" CCD sensor chip, image format 1280 x 1024 pixels, can be configured with Spectation as of V2.8, PROFINET and TCP/IP communication, with lens barrel	6GF1 724-0BA
SIMATIC VS725 Color Basic Intelligent camera for color recognition; with 1/4" color CCD sensor chip, image format 640 x 480 pixels, can be configured with Spectation V2.6 and higher, Ethernet TCP/IP interface	6GF1 725-0AA01

PROFINET/Industrial Ethernet

Image Processing System

SIMATIC VS720

2

Ordering data	Order No.		Order No.
SIMATIC VS725-S High Speed/Color Intelligent stainless-steel camera with high processing speed, with IP68 degree of protection; with 1/4" color CCD sensor chip, image format 640 x 480 pixels, can be configured with Spectation as of V2.8, PROFINET and TCP/IP communication, with lens barrel	6GF1 725-0BA	Plastic lens barrel for VS72x-S series to be used as replacement part, made of plastic, suitable for lenses up to 35 mm long and 43 mm in diameter	6GF9 008-2AA
SIMATIC VS726A High Speed/Color Intelligent camera with medium image processing speed; with 1/4" color CCD sensor chip, image format 640 x 480 pixels, can be configured with Spectation V2.8 and higher, PROFINET and TCP/IP communication	6GF1 726-0AA11	Stainless-steel lens barrel for VS72x-S series to be used as replacement part, made of stainless steel, suitable for lenses up to 65 mm long and 53 mm in diameter	6GF9 008-2AA01
Accessories SIMATIC Spectation V2.8.1 configuring software For creating user programs for SIMATIC VS72x and configuring the VS Link; executable under MS Windows Professional SP1, MS Windows XP SP1; English/German; single license on CD-ROM, for the VS72x intelligent cameras	6GF8 007-3AA28	V4A intermediate ring for lens barrel 6GF9 008-2AA for VS72x-S series, of stainless steel (V4A), with sealing ring. Lenses up to 58 mm long and 43 mm diameter can be attached using this intermediate ring	6GF9 008-2AB
Interface module VS Link For connecting a SIMATIC VS72x to a VGA monitor without PC; for visualizing inspection images, result tables, with user-friendly display functions, with Ethernet interface	6GF9 003-2AA	V2A intermediate ring for lens barrel 6GF9 008-2AA and 6GF9 008-2AA01 for VS72x-S series, of stainless steel (V2A), with sealing ring. Lenses up to 58 mm long and 43 mm diameter can be attached using this intermediate ring	6GF9 008-2AB01
Interface module VS Link PROFIBUS For connecting a SIMATIC VS72x to a VGA monitor without PC; for visualizing inspection images, result tables, with user-friendly display functions, with Ethernet interface, with Ethernet and PROFIBUS DP Gateways	6GF9 003-2AB	Adapter ring For VS72x series, 5 mm, CS-Mount to C-Mount	6GF9 001-1AP02
Protective housing for SIMATIC VS72x, (not for VS72x-S) Stainless steel, IP61; with polycarbonate disk; max. lens length 42 mm	6GF9 002-2AC	Cable for power supply and I/O Pre-assembled at one end • 3 m • 15 m	6GF9 002-2AD01 6GF9 002-2AE01
Mounting plate for vertical mounting of SIMATIC VS72x and VS72x-S Cannot be used in combination with protective housing. • For industrial use with two tripod threads • For laboratory use with one tripod thread	6GF9 002-2AA01 6GF9 002-2AB	Cable for power supply and I/O • single side design, highly flexible, drag-capable, not for stainless steel models (VS72x-S series) - 10 m - 20 m • Single-sided, highly flexible, drag-capable, for VS72x-S series; Length 15 m	6GF9 008-2AL 6GF9 008-2AN 6GF9 008-2AK
		Cable for serial interface of VS Link with RJ12 plug	6GF9 002-2AH
		Ethernet cable for SIMATIC VS72x Highly flexible, suitable for trailing, with RJ45/RJ45 plug • 10 m • 20 m	6GF9 008-2AP 6GF9 008-2AQ
		Ethernet cable for SIMATIC VS72x-S Highly flexible, drag-capable, with M12 plug (8-pin) and RJ45 plug; length 15 m	6GF9 008-2AM
		Interface converter for VS Link RJ12 to DB9	6GF9 002-2AG01
		Strain relief assembly for VS72x for Ethernet and I/O cable connection of the VS720 series	6GF9 002-2AJ

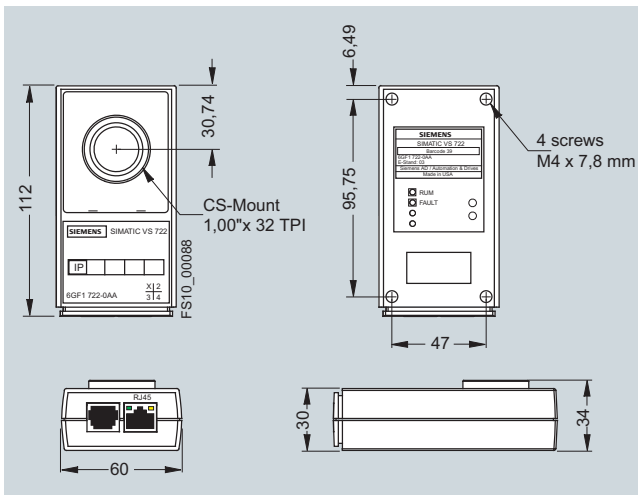
PROFINET/Industrial Ethernet

Image Processing System

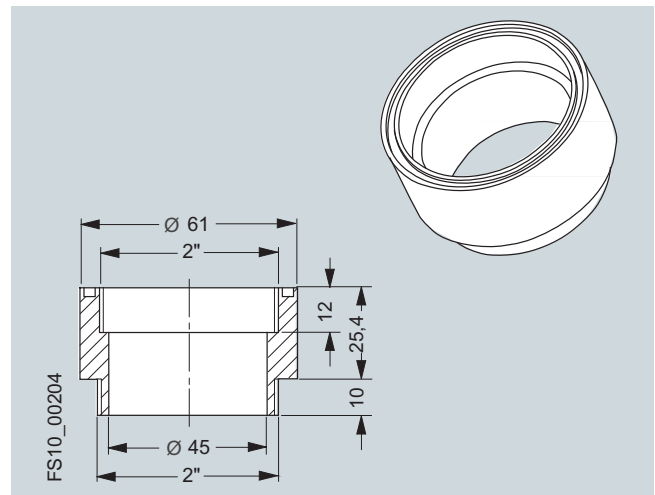
SIMATIC VS720

Dimensional drawings

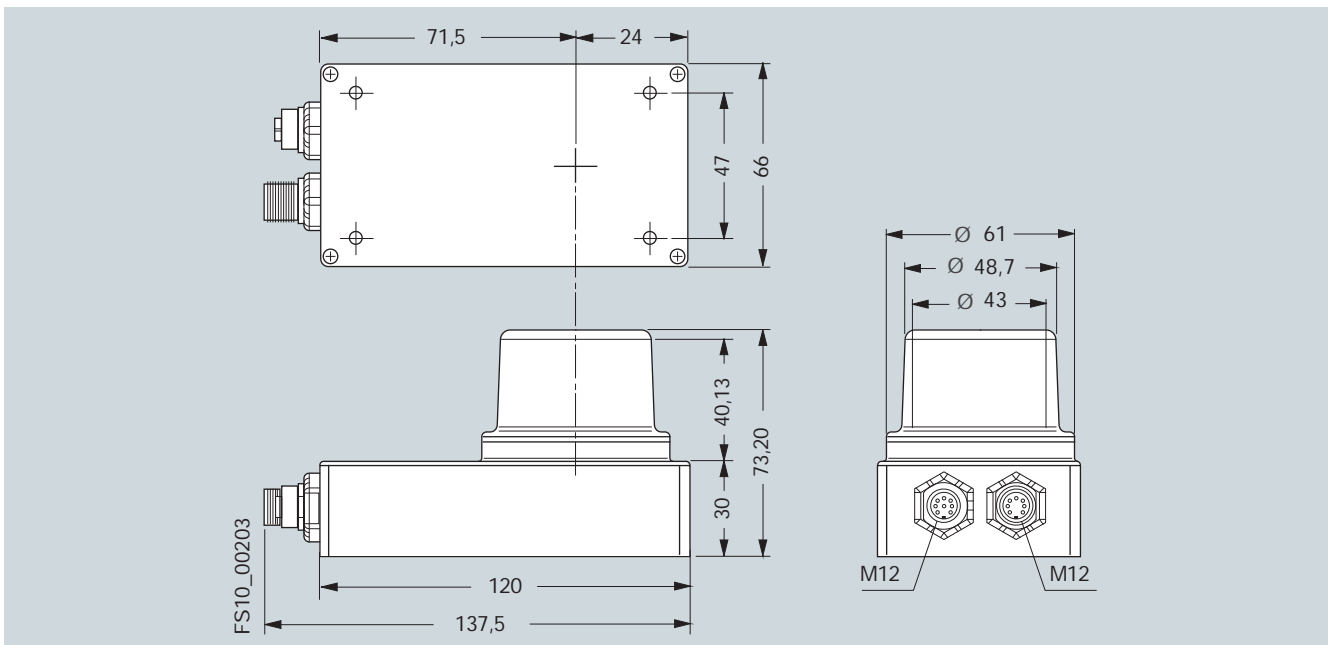
2



Intelligent camera VS720



Intermediate ring for lens barrel 6GF9 008-2AB



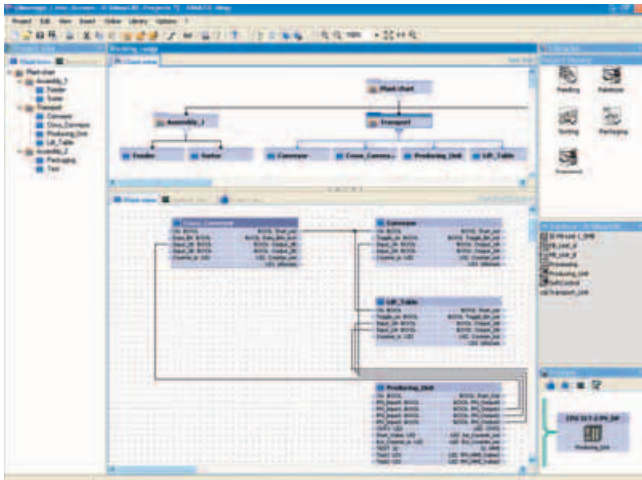
Intelligent stainless-steel camera VS720-S

PROFINET/Industrial Ethernet

Engineering/Network management/Diagnostics

SIMATIC iMap

Overview



- Component-based software tool for configuring the communication in distributed automation solutions
- For easy graphical configuration of the communication between subsystems and machine-to-machine communication in the production line
- Based on the PROFINET standard
- Open for PROFINET devices from various manufacturers on Industrial Ethernet
- Runs under Windows 2000, Windows XP Professional and Windows 2003 Server

Benefits

The clear advantage of SIMATIC iMap over programmed communication lies in the simple programming of the communication (graphically using lines interconnecting the technology interfaces of the devices).

Technical specifications

Product type description	Engineering Tool SIMATIC iMap
Current version	V3.0
Software class	A
Applications	
Keyword	SIMATIC iMap is an engineering tool for configuring communication between automation and field devices in distributed automation solutions.
Marketing message	"Time and cost savings in modular machine and plant construction with Component Based Automation." "Modularization and machine-to-machine communication along the production line."
Advantages	<ul style="list-style-type: none"> • Open component-based engineering tool to the PROFINET standard. • Simple communication between intelligent automation and field devices on PROFIBUS DP and on Ethernet. • Graphical configuration of communication on PROFIBUS DP and on Ethernet • Extremely high reusability of software components (technology modules) • Graphical structuring of the plant using "chart-in-chart" function • Convenient navigation through the project tree • Easy creation and structuring of technology libraries • PROFIBUS and Ethernet in the overview of the network view • Fast start-up thanks to downloading and testing directly on Ethernet (also of PROFIBUS slaves) • Online display of values of the technology modules on the interfaces and in the variable table • Diagnosis of communication in the diagnostics window
Sectors	<ul style="list-style-type: none"> • Automotive industry (especially in assembly, conveyor systems and in the paint shop) • Complex food and packaging machines • Conveyor systems based on PROFIBUS DP • Production lines with several interlinked machines

PROFINET/Industrial Ethernet

Engineering/Network management/Diagnostics

SIMATIC iMap

Technical specifications

Product type description	Engineering Tool SIMATIC iMap	Product type description	Engineering Tool SIMATIC iMap
Target systems	<ul style="list-style-type: none"> SIMATIC S7 CPU 31x-2 PN/DP and SIMATIC S7 CPU 319-3 PN/DP (with integrated PROFINET interface). This can be used as a proxy function for the devices of a complete PROFIBUS segment, one line only) SIMATIC WinAC PN (can be used as a proxy function for the devices of a complete PROFIBUS segment, one line only) SIMATIC NET IE/PB Link (can be used as a proxy function for the devices of a complete PROFIBUS segment) SIMATIC NET CP 343-1 and CP 343-1 Advanced (for connecting SIMATIC S7-300 to Ethernet), CP443-1 Advanced (for connecting SIMATIC S7-400 to Ethernet) Distributed I/O stations with separate CPU (all intelligent field devices on PROFIBUS such as SIMATIC CPU 313C-2DP, CPU 314C-2DP, CPU 315-2DP, CPU 316-2DP, ET 200 IM 151 CPU, ET 200S BM 147 CPU), PROFINET CBA OPC Server (for access from PC applications to data in PROFINET devices) Devices on Industrial Ethernet based on the PROFINET CBA standard SIMATIC OPs (within the components) SIMATIC ProTool/Pro, WinCC or any other visualization system with OPC client function 	System requirements	
		Operating system	Windows 2000 Prof. Service Pack 4 and higher or Windows XP Prof. Service Pack 1 and higher or Windows 2003 Server Service Pack 1 and higher; PC administration rights are required for installation
		PG/PC hardware	Pentium processor, 1 GHz or higher
		Recommended expansion of main memory in PG/PC	RAM: 512 MB or more
		Hard disk space required in PG/PC	Approx. 200 MB
		Software required	<ul style="list-style-type: none"> STEP 7 V5.3 Service Pack 3 or higher PN OPC server V6.3 or higher The following software must be installed before iMap (included in the iMap package): <ul style="list-style-type: none"> MS Internet Explorer V6.0 Service Pack 1 and higher Adobe Acrobat Reader V5.0
		Delivery format	
		Languages	English, German, French, Italian and Spanish
		Single License (SL)	Yes
		Upgrade License (UL)	Yes, from V2.0 to V3.0
		Paper manuals	Electronically on CD
		Authorization/licenses	
		Authorization	Yes
		Single License (SL)	Yes
		Upgrade License (UL)	Yes
		Software Update Service	Yes
		Unlock Copy License	No

Ordering data

Order No.

SIMATIC iMap V3.0

Target system:

CPU 31x-2 PN/DP, CPU 319-3 PN/DP, SIMATIC WinAC PN, SIMATIC NET IE/PB Link, SIMATIC NET CP 343-1, SIMATIC NET CP 343-1 Advanced, SIMATIC NET CP 443-1 Advanced, distributed I/O devices with own CPU, PROFINET CBA OPC server, devices on the Industrial Ethernet based on the PROFINET CBA standard, SIMATIC OPs, SIMATIC ProTool/Pro

Requirements:

Windows 2000 Prof. with Service Pack 4 or later or Windows XP Prof. with Service Pack 1 or later or Windows 2003 Server with Service Pack 1 or later; on PG or PC with Pentium processor, min. 1 GHz; STEP 7 V5.3 or later with Service Pack 3, PN OPC Server V6.3 or later

Delivery form: German, English, with electronic documentation

- Single license
- Software Update Service (requires current software version)
- Upgrade to V3.0, single license

6ES7 820-0CC04-0YA5

6ES7 820-0CC01-0YX2

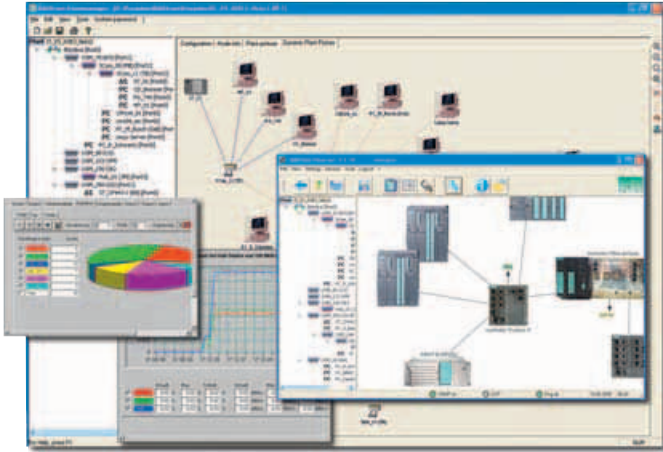
6ES7 820-0CC04-0YE5

PROFINET/Industrial Ethernet

Engineering/Network management/Diagnostics

BANYnet bus analysis and diagnostics

Overview



BANYnet plant configuration

BANYnet is a tool based on Microsoft Windows for documentation, monitoring, diagnostics, recording and analysis of Ethernet and PROFIBUS networks.

- Management of all IP and MAC addresses in the network
- Generation of a network overview map
- Automatic scanning of network
- Monitoring of network nodes for "Failure", "Newly added", "Not registered"
- Reading out of data, message frame types and error statistics from the network components
- Display of bus load
- Recording of message frame traffic
- Recording of PROFINET communication
- Recording of PROFIBUS communication
- Comprehensive trigger, filter and sorting functions

Benefits



- Continuously updated overview of the configured network (number/type of components)
- Permanent bus load display ensures sufficient performance in the network
- Fast localization of errors in network components
- Network optimization through statistics on type and length of message frame, cycle time, etc.

Application

The functionality for this is distributed as follows between five independent program modules:

- The Plant Manager of BANYnet Ethernet offers valuable support toward configuration of your plant through management of IP and MAC addresses, automatic generation of the plant display, and import and export functions.
- The Observer scans the network using various protocols, and displays safety-related changes in the network topology both in an overview and in a hierarchy.
- The Plant Diagnostics reads the configuration data as well as comprehensive message frame type and error statistics from the SNMP-capable network components, and provides information to assist searching for errors in the Ethernet network. Data such as bus load or lifelist are evaluated and displayed online.
- The Bus Analysis records the message frame traffic on one or more Ethernet buses synchronously, and interprets the message frames throughout all levels, including SIMATIC S7/PCS 7 and PROFINET. Comprehensive trigger, filter and sorting functions allow fast localization of errors.
- The Profibus Scope records the message frame traffic of a PROFIBUS network using a CP 5512, and interprets the message frames accordingly. Comprehensive trigger, filter and sorting functions allow fast localization of errors.

Function

The **Plant Manager** is used to configure the database of the BANYnet project. All information required is created in data structures. An import/export function allows data exchange with other programs. A user-friendly plant overview is automatically generated from the data structures. The Plant Manager can therefore be used for both documentation and configuration of Ethernet networks. Tables provide detailed information on the properties of the nodes. Furthermore, any type of information can be assigned to the individual nodes for documentation purposes.

The **Plant Diagnostics** scans the system data of SNMP-capable network nodes (e.g. switches, PCs), and thus provides information on the configured nodes. The bus load display of the individual ports (numeric or graphic) and the list of nodes provide great assistance in locating errors in the Ethernet network.

Statistics functions provide information on the number of individual message frame types (packet lengths, message frame types, error types, etc.). The events (traps) sent by the switch can be displayed in a list.

Parameterization of the SCALANCE X and OSM/ESM Industrial Ethernet switches is supported in addition, e.g. IP address, port configuration or firmware update.

PROFINET/Industrial Ethernet

Engineering/Network management/Diagnostics

BANYnet bus analysis and diagnostics

Function (continued)

The **Bus Analysis** allows user-friendly analysis of recorded files (import/export of Netmon or Sniffer files is also possible) over several interfaces simultaneously (e.g. for redundancy analyses) by means of the integral BANYmon. Errors can be rapidly located using predefined or user-generated filter and sorting functions. When one of the listed message frames is clicked, the associated detailed information is output. SIMATIC S5/S7/PCS 7-specific message frames are interpreted and displayed according to their type (e.g. redundant message frames, alarm-8 message frames, etc.).

When using a CP 1616, PROFINET data traffic can be recorded without time losses and with complete message frame interpretation.

The **Observer** permits user-friendly and reliable dynamic monitoring of your network. The actual state is compared with the project created in the Plant Manager, and changes are displayed immediately. In order to locate events such as errors or the penetration of unknown nodes, it is possible to graphically trace the network hierarchy back to the source. In addition, these events are saved in log files for later analysis and documentation.

Furthermore, the scanned data can be imported into the project and updated supplementary to the Plant Manager.

The **PROFIBUS Scope** permits recording, saving and user-friendly analysis of bus events. It supports all baud rates from 9.6 Kbit/s to 12 Mbit/s, and determines these automatically. The recording can be carried out in a linear buffer or a cyclic buffer of selectable size. Long-term recording is possible in this manner. The start and end of recording can be automated using triggers. The data quantities can be reduced during the recording using predefined or user-created filter and sorting functions, and errors can be easily located by means of the subsequent analysis. When a listed message frame is clicked, its detailed information is output. The SIMATIC S7/PCS 7-specific message frames are interpreted and displayed depending on their type (e.g. redundant message frames, alarm-8 message frames, etc.). The following protocols are interpreted: DP, FDL, DPV1, DPV2, FMS and S7.

The BANYnet function for executing several recordings in parallel can be used for the **redundancy analysis**. BANYnet PROFIBUS is connected to the redundant bus segments for this purpose. Since the recorded message frames are assigned synchronous time stamps, the communication flow information can be easily compared. This allows fast and exact locating of redundancy problems.

Note:

The computer with the BANYnet PROFIBUS program package requires a CP 5512 (PC card) for the PROFIBUS connection.

Ordering data

Order No.

BANYnet bus analysis and diagnostics

Program package for PC/PG for Microsoft Windows NT/2000/XP SP2 and electronic documentation on CD, dual language (German, English), software protected by USB dongle

• **BANYnet Ethernet**
for Industrial Ethernet networks

9AE4 100-1DB00

• **BANYnet PROFIBUS**
for PROFIBUS networks;
(CP 5512 is required)

9AE4 100-1DE00

• **BANYnet Ethernet and PROFIBUS**
for Ethernet and PROFIBUS networks;
(CP 5512 is required)

9AE4 100-1DF00

CP 5512 communications processor

PC card (CardBus, 32 bit) for connection of a programming device or notebook to PROFIBUS or MPI, under 32 bit in connection with PROFIBUS SOFTNET software or STEP 7; German/English

6GK1 551-2AA00

More information

Support:

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